NHL-2NA Series Transceivers

Service Software Instructions & Service Concepts

Issue 2 11/02

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Service Software Phoenix

Note: Please refer to the Service Concepts section to check the correct way to connect the cables.

Phoenix Installation Steps in Brief

These are the basic steps to install the Phoenix

- Install the Phoenix Service SW
- Install the Data Package for Phoenix (product specific data and flash update package)
- Manage connection settings (depends on the tools you are using)
- Update FPS-8 SW (if you use FPS-8)
- Activate FPS-8
- Update JBV-1 Docking Station SW (only when needed)
- The flash update files are delivered with then Phoenix Data Package so unless you want to use certain version of this package, separate installation package is not needed anymore. If you want to use it, it should be installed after connection management, before FPS-8 update.

Please refer to Technical Bulletins for more information concerning phone model specific service tools and equipment setup.

Phoenix Service SW

Before Installation

- Check that a Dongle is attached to the parallel port of your computer.
- Download the installation package (e.g. *nhl2na_nhm4_nhm7_nhm8_npe4_npl1_npm9_03_72_002.exe*) to your computer (e.g. C:\TEMP)
- Close all other programs
- Run the application file (e.g. *nhl2na_nhm4_nhm7_nhm8_npe4_npl1_npm9_03_72_002.exe)* and follow instructions on the screen
- Administrator rights may be required to be able to install Phoenix depending on the Operating System
- If dongle driver is installed or updated, you need to reboot your PC before the installation can continue.
- If uninstalling or rebooting is needed at any point, you will be prompted by the Install Shield program.

If at any point during installation you get this message, *"Dongle is not found and installation can´t continue*", the possible reasons may be a defective or too old PKD-1Dongle (five digit serial number Dongle when used with FPS-8 Prommer) or that the FLS-4S POS Flash Dongle is defective or power is not supplied by external charger.

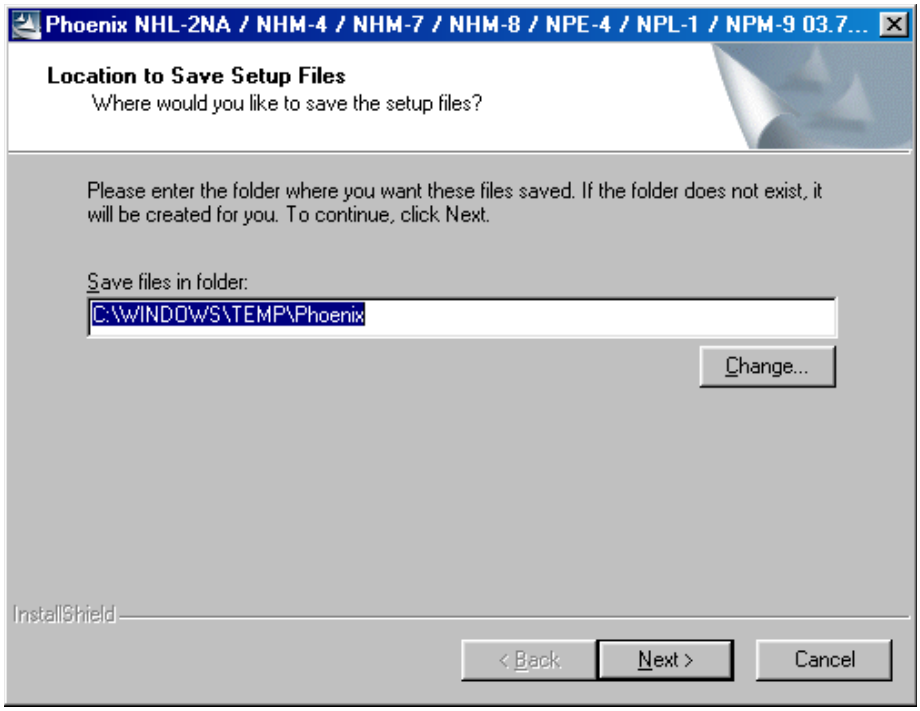
Check the COM/parallel ports used first! After correcting the problem Installation can be restarted.

Dongle not found
Insert Nokia dongle and click Retry to re-detect the dongle or click Cancel to exit the installation.
Retry
Cancel

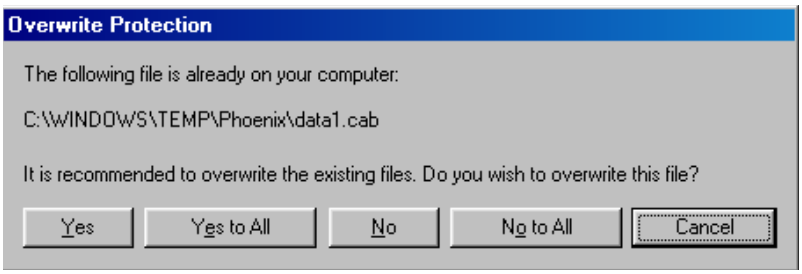
Startup

Run the nhl2na_nhm4_nhm7_nhm8_npe4_npl1_npm9_03_72_002.exe to start installation.

When you choose “Next” the files needed for installation will be extracted. Please wait...


Phoenix NHL-2NA / NHM-4 / NHM-7 / NHM-8 / NPE-4 / NPL-1 / NPM-9 03.7...
Location to Save Setup Files
Where would you like to save the setup files?
Please enter the folder where you want these files saved. If the folder does not exist, it will be created for you. To continue, click Next.
Save files in folder:
C:\WINDOWS\TEMP\Phoenix
Change...
InstallShield
< Back
Next >
Cancel

If the setup files are already extracted (left in the file system from previous installation) following dialog appears. Always click "Yes to All" to overwrite the existing setup files.



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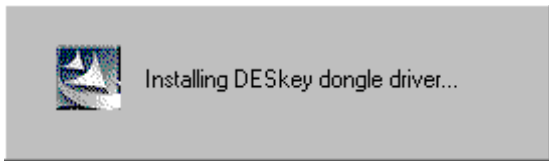
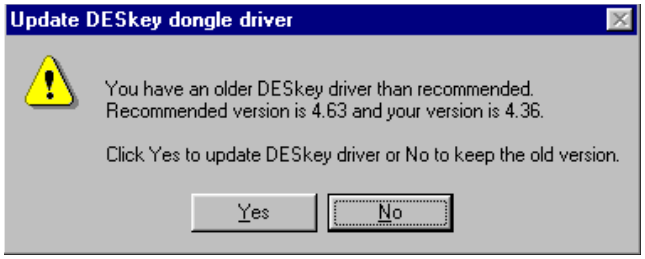
Dongle Driver Installation and Version Check

If there is no previously installed Dongle driver, installation will take place.

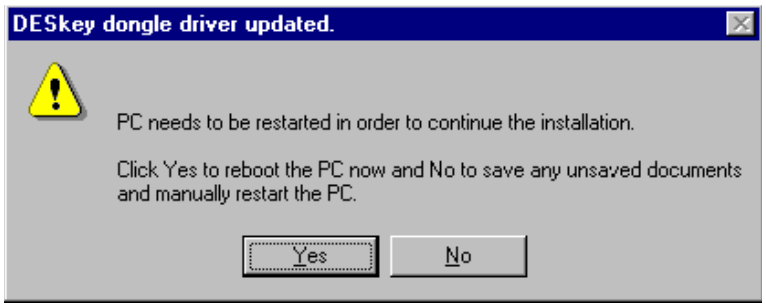


If Dongle driver is installed and it is older than the latest supported version, the latest version will be installed when you choose "Yes". The latest version is always included in the latest Phoenix installation package.


Update DESkey dongle driver
You have an older DESkey driver than recommended.
Recommended version is 4.63 and your version is 4.36.
Click Yes to update DESkey driver or No to keep the old version.
Yes
No

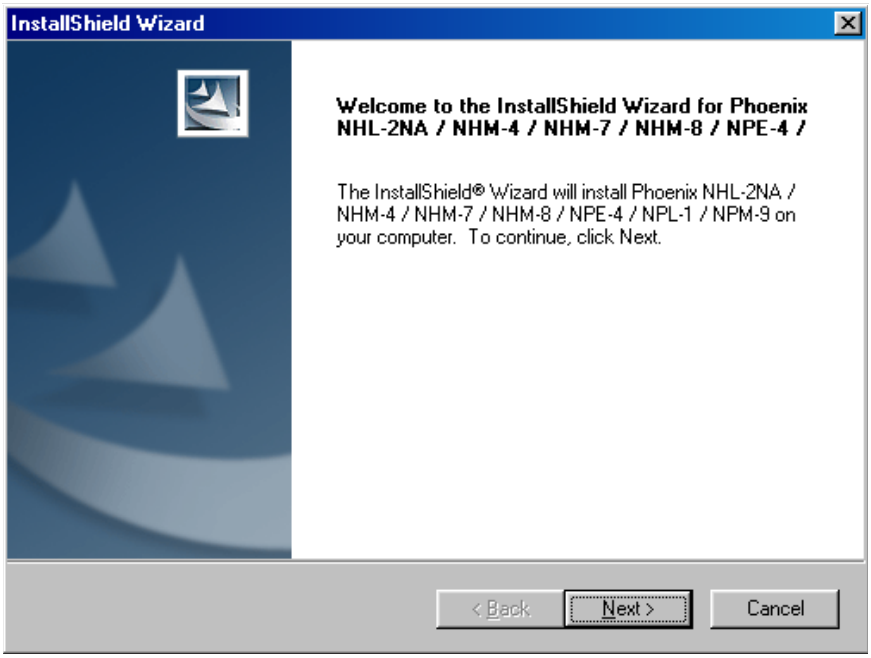
PC needs to be rebooted before installation can continue. Click "Yes" to reboot the PC.

Setup is restarted automatically after reboot.


DESkey dongle driver updated.
PC needs to be restarted in order to continue the installation.
Click Yes to reboot the PC now and No to save any unsaved documents and manually restart the PC.
Yes
No

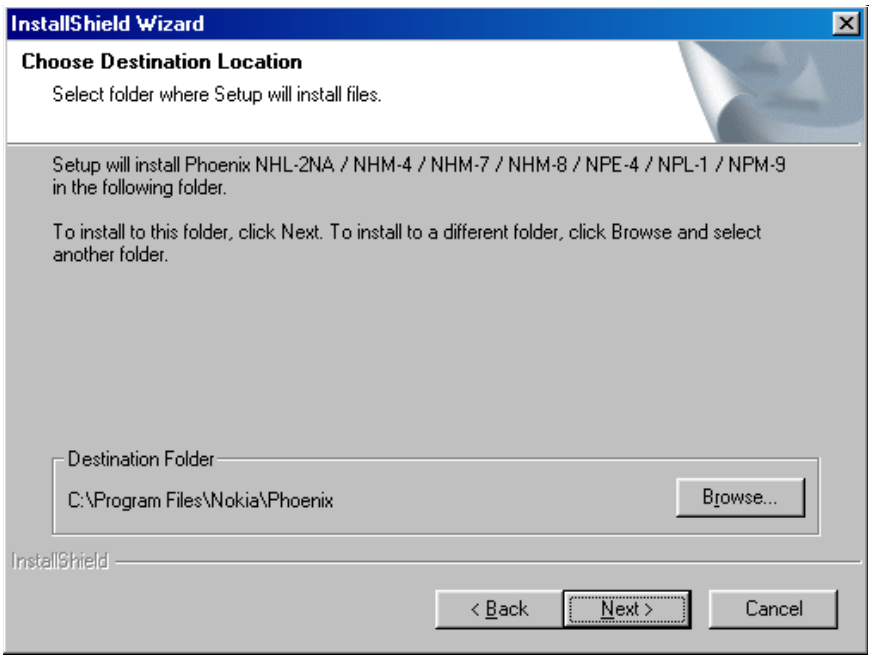
First Time Installation of Phoenix

After Dongle driver installation / update (if needed) installation continues from this step. Click "Next" in Welcome dialog to continue.


InstallShield Wizard
Welcome to the InstallShield Wizard for Phoenix NHL-2NA / NHM-4 / NHM-7 / NHM-8 / NPE-4 /
The InstallShield® Wizard will install Phoenix NHL-2NA / NHM-4 / NHM-7 / NHM-8 / NPE-4 / NPL-1 / NPM-9 on your computer. To continue, click Next.
< Back
Next >
Cancel

Choose destination folder, it is recommended to use the default folder *C:\Program-Files\Nokia\Phoenix*.

Choose "Next" to continue. You may choose another location by selecting "Browse" (not recommended)


InstallShield Wizard
Choose Destination Location
Select folder where Setup will install files.
Setup will install Phoenix NHL-2NA / NHM-4 / NHM-7 / NHM-8 / NPE-4 / NPL-1 / NPM-9 in the following folder.
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.
Destination Folder
C:\Program Files\Nokia\Phoenix
Browse...
InstallShield
< Back
Next >
Cancel

Setup copies the components. Please wait. Progress of the setup is shown. Please wait...

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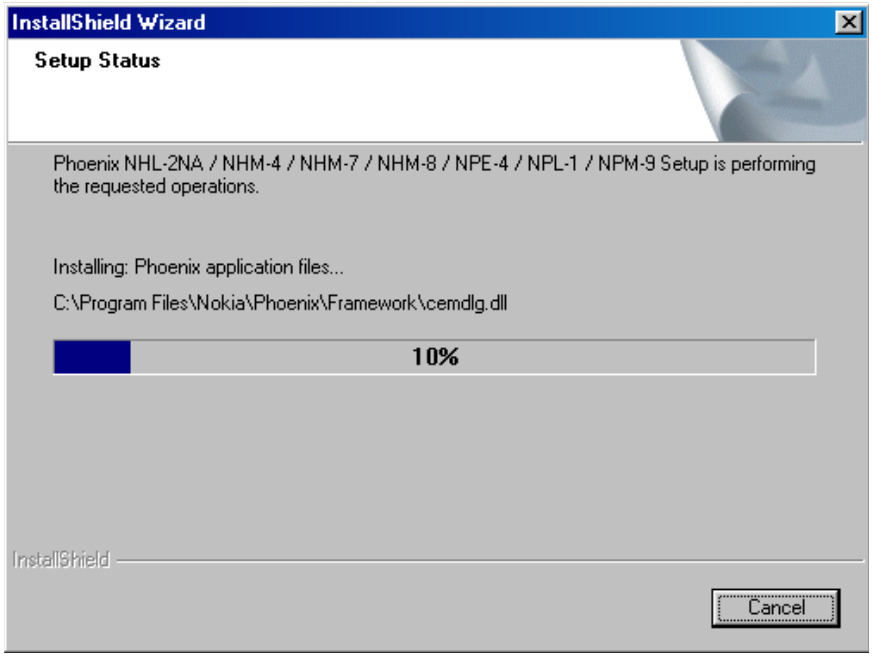
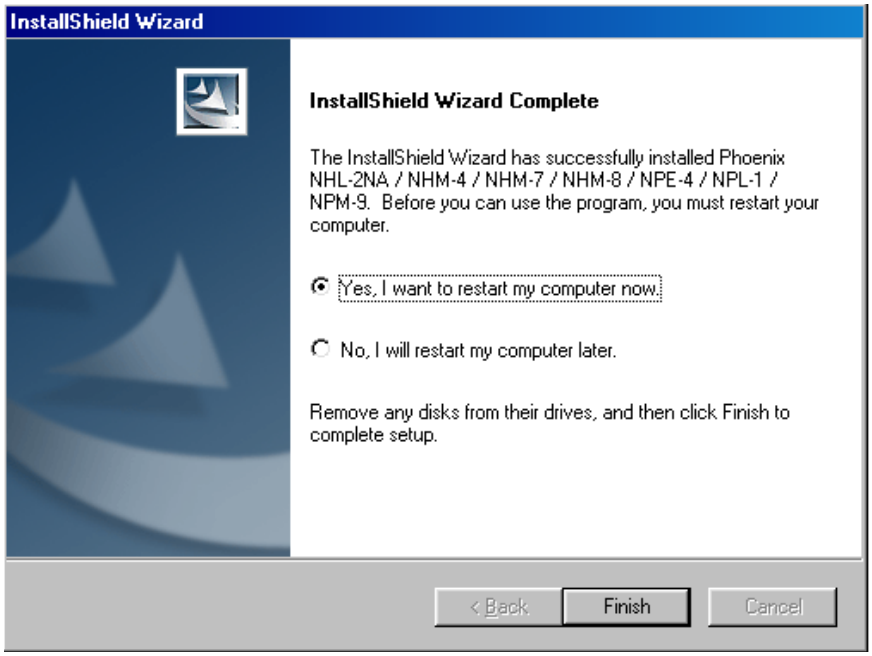

InstallShield Wizard
Setup Status
Phoenix NHL-2NA / NHM-4 / NHM-7 / NHM-8 / NPE-4 / NPL-1 / NPM-9 Setup is performing the requested operations.
Installing: Phoenix application files...
C:\Program Files\Nokia\Phoenix\Framework\cemdlg.dll
10%
InstallShield
Cancel

If restarting of your computer is needed the Install Shield Wizard will tell you about it.

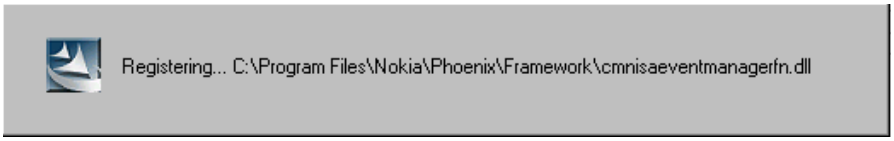
Select "Yes..." to reboot the PC immediately and "No..." to reboot the PC manually.

Note that Phoenix doesn't work, if components are not registered. Click "Finish" to continue.


InstallShield Wizard
InstallShield Wizard Complete
The InstallShield Wizard has successfully installed Phoenix NHL-2NA / NHM-4 / NHM-7 / NHM-8 / NPE-4 / NPL-1 / NPM-9. Before you can use the program, you must restart your computer.
Yes, I want to restart my computer now.
No, I will restart my computer later.
Remove any disks from their drives, and then click Finish to complete setup.
< Back
Finish
Cancel

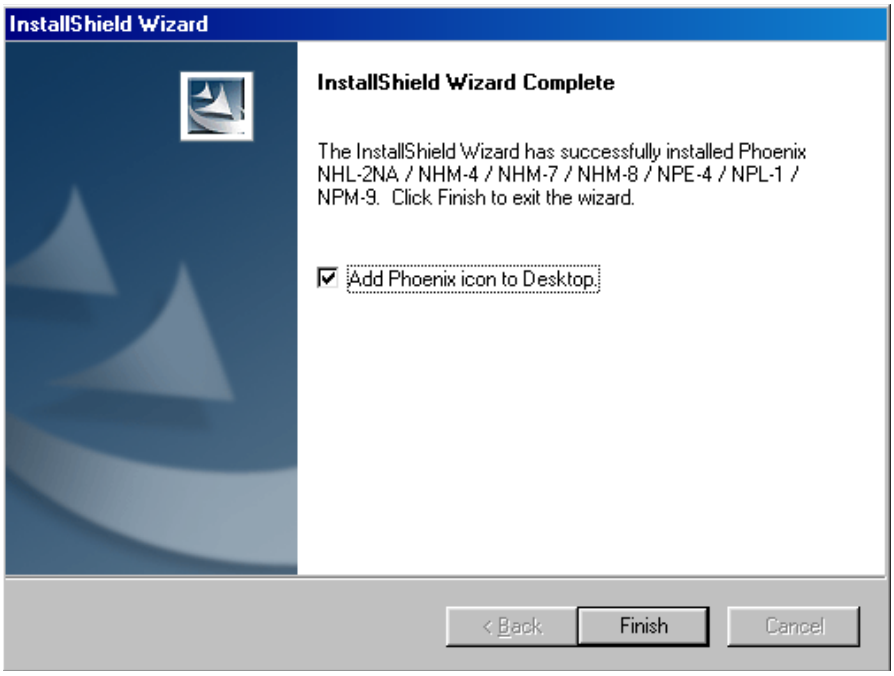
After the reboot components are registered and Phoenix is ready for use.

If reboot is not needed components are registered after copying them.



If restarting of your computer is not needed, this view will be shown instead.

Click "Finish" to exit the setup. Phoenix is now ready for use.


InstallShield Wizard
InstallShield Wizard Complete
The InstallShield Wizard has successfully installed Phoenix NHL-2NA / NHM-4 / NHM-7 / NHM-8 / NPE-4 / NPL-1 / NPM-9. Click Finish to exit the wizard.
Add Phoenix icon to Desktop.
< Back
Finish
Cancel

Now the installation of Phoenix Service SW is ready and it can be used after:

- Installing Phone model specific Phone Data Package for Phoenix
- Configuring the connections
- Updating the Flash Update Package files used with FPS-8* and FLS-4* tools

Update Installation of Phoenix

If you already have the Phoenix Service SW installed on your computer, sooner or later there will be need to update it when new versions are released.

Please note that very often the Phoenix Service SW and the Phone Specific Data Package for Phoenix come in pairs, meaning that certain version of Phoenix can only be used with certain version of Data Package. Always use the latest available versions of both. Instructions can be found in phone model specific Technical Bulletins.

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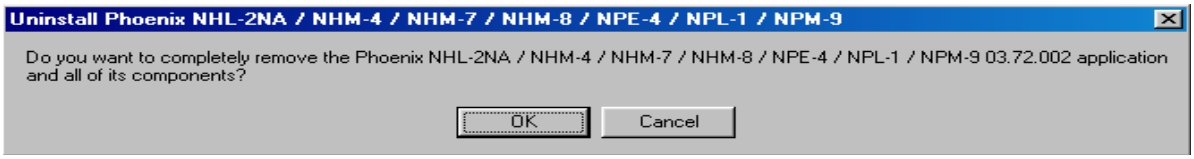
To update the Phoenix you need to take exactly the same steps as when installing it for the first time.

- Download the installation package to your computer hard disk
- Close all other programs
- Run the application file (e.g. *nhl2na_nhm4_nhm7_nhm8_npe4_npl1_npm9_03_72_002.exe*)
- Dongle driver version will be checked and if need be, updated
- After reboot installation starts automatically
- Newer version of Phoenix will be installed

When you update the Phoenix from old to new version (e.g. update from 03.65.00 to 03.72.002), the update will take place automatically without uninstallation

If you try update the Phoenix with the same version that you already have (e.g. 03.72.002 to 03.72.002) you are asked if you want to uninstall the version of Phoenix you have on your PC. Answer "OK" to uninstall Phoenix, "Cancel" if you don't want to uninstall.


Uninstall Phoenix NHL-2NA / NHM-4 / NHM-7 / NHM-8 / NPE-4 / NPL-1 / NPM-9
Do you want to completely remove the Phoenix NHL-2NA / NHM-4 / NHM-7 / NHM-8 / NPE-4 / NPL-1 / NPM-9 03.72.002 application and all of its components?
OK
Cancel

If you try to install an older version (e.g. downgrade from 03.72.002 to 03.55.000) installation will be interrupted

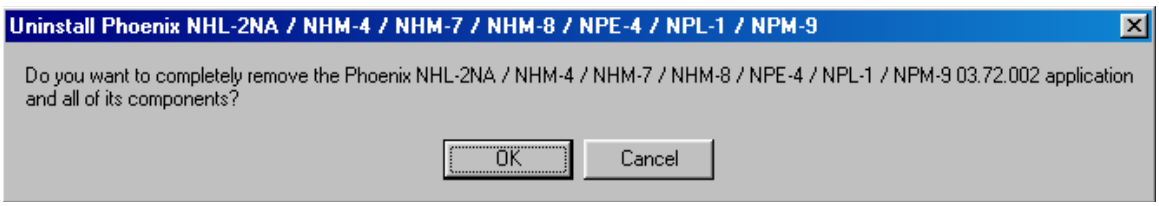
Please always follow the instructions on the screen.

How to Uninstall Phoenix

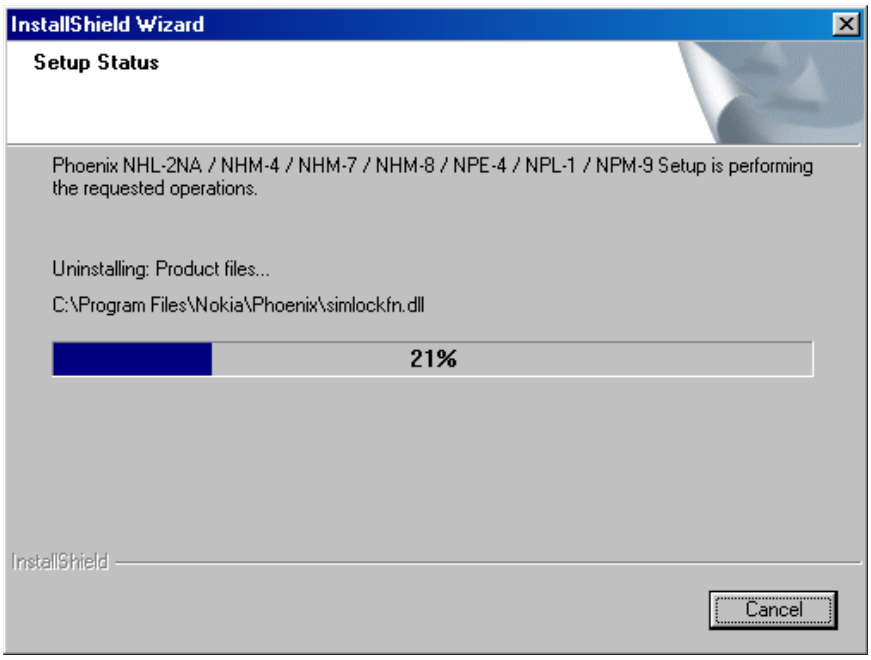
Uninstallation can be done manually from Windows Control Panel - Add / Remove Programs.

Choose "Phoenix NHL-2NA / NHM-4 / NHM-7 / NHM-8 / NPE-4 / NPL-1 / NPE-9 Release" click "Add/Remove".

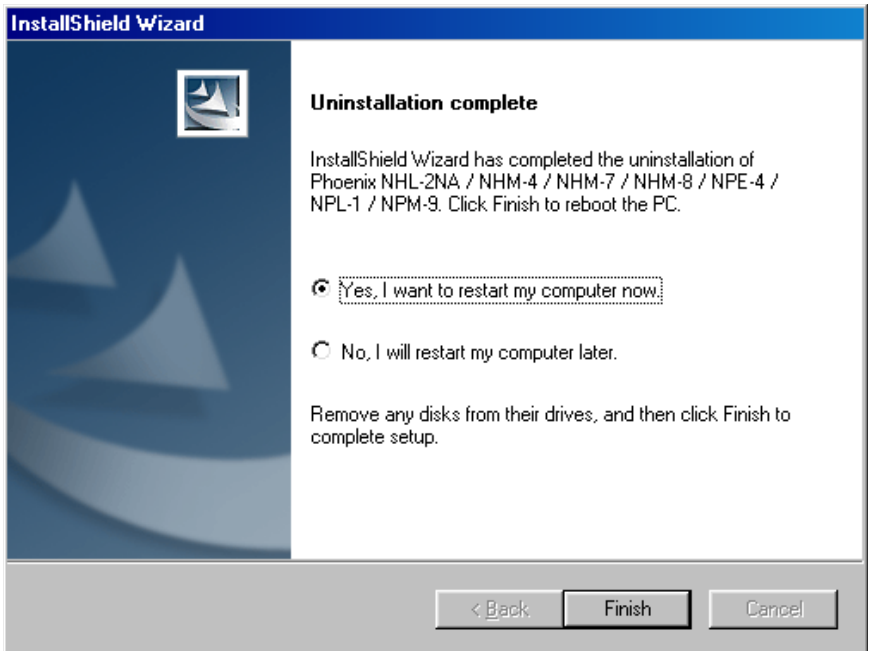
Choose "OK" to uninstall


Uninstall Phoenix NHL-2NA / NHM-4 / NHM-7 / NHM-8 / NPE-4 / NPL-1 / NPM-9
Do you want to completely remove the Phoenix NHL-2NA / NHM-4 / NHM-7 / NHM-8 / NPE-4 / NPL-1 / NPM-9 03.72.002 application and all of its components?
OK
Cancel

Progress of the uninstallation is shown.


InstallShield Wizard
Setup Status
Phoenix NHL-2NA / NHM-4 / NHM-7 / NHM-8 / NPE-4 / NPL-1 / NPM-9 Setup is performing the requested operations.
Uninstalling: Product files...
C:\Program Files\Nokia\Phoenix\simlockfn.dll
21%
InstallShield
Cancel

You might have to reboot the PC after uninstallation.


InstallShield Wizard
Uninstallation complete
InstallShield Wizard has completed the uninstallation of Phoenix NHL-2NA / NHM-4 / NHM-7 / NHM-8 / NPE-4 / NPL-1 / NPM-9. Click Finish to reboot the PC.
Yes, I want to restart my computer now.
No, I will restart my computer later.
Remove any disks from their drives, and then click Finish to complete setup.
< Back
Finish
Cancel

Note: If you have different product packages installed, components are uninstalled only if they are not included in other product packages.

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Data Package for Phoenix (Product Specific)

Before installation

- Product Data Package contains all product specific data to make the Phoenix Service Software and tools usable with a certain phone model.
- It also includes the latest version of flash update package for FLS-4* and FPS-8*
- Check that the Dongle is attached to the parallel port of your computer.
- Install Phoenix Service SW
- Download the installation package (e.g. *NHL-2NA_dp_v_3.08.exe*) to your computer (e.g. C:\TEMP)
- Close all other programs
- Run the application file (e.g. *NHL-2NA_dp_v_3.08.exe*) and follow instructions on the screen

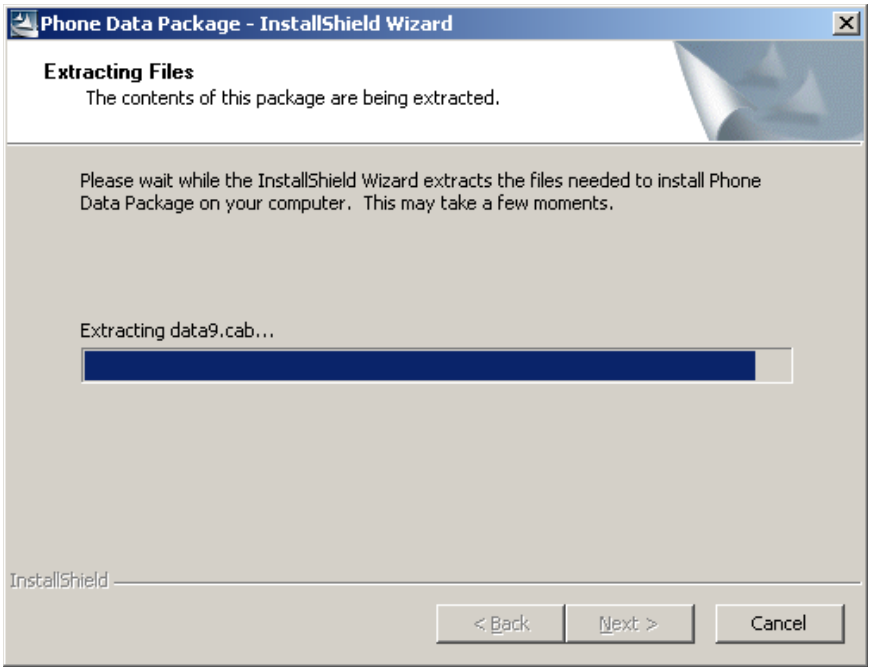
If you already have the Phoenix Service SW installed on your computer, sooner or later there will be need to update it when new versions are released.

Please note that very often the Phoenix Service SW and the Phone Specific Data Package for Phoenix come in pairs, meaning that certain version of Phoenix can only be used with certain version of Data Package. Always use the latest available versions of both. Instructions can be found in phone model specific Technical Bulletins.

Installation of Phoenix Data Package (Product Specific)

Run the *NHL-2NA_dp_v_3.08.exe* to start installation.

When you choose "Next" the files needed for installation will be extracted. Please wait...


Phone Data Package - InstallShield Wizard
Extracting Files
The contents of this package are being extracted.
Please wait while the InstallShield Wizard extracts the files needed to install Phone Data Package on your computer. This may take a few moments.
Extracting data9.cab...
InstallShield
< Back
Next >
Cancel

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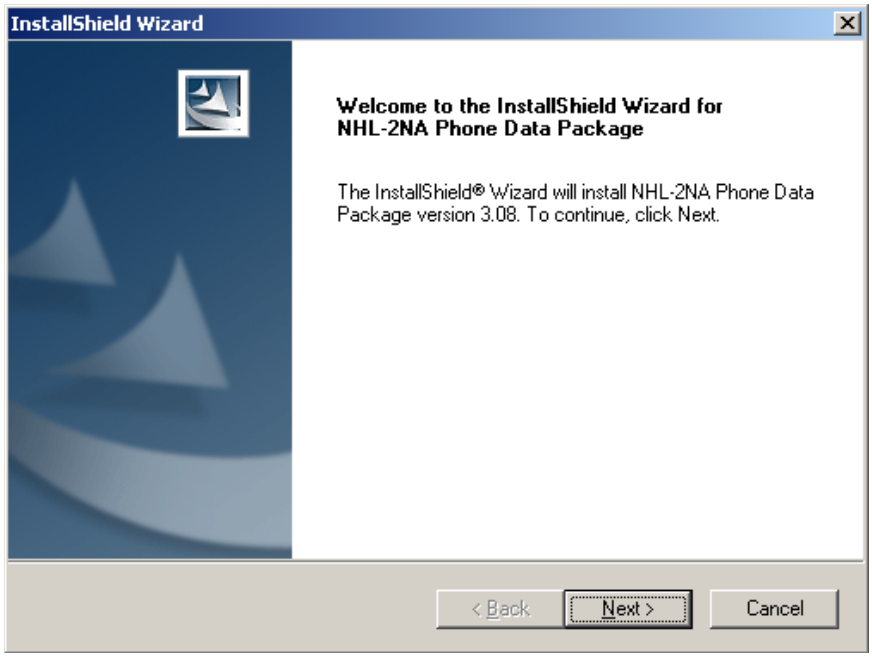
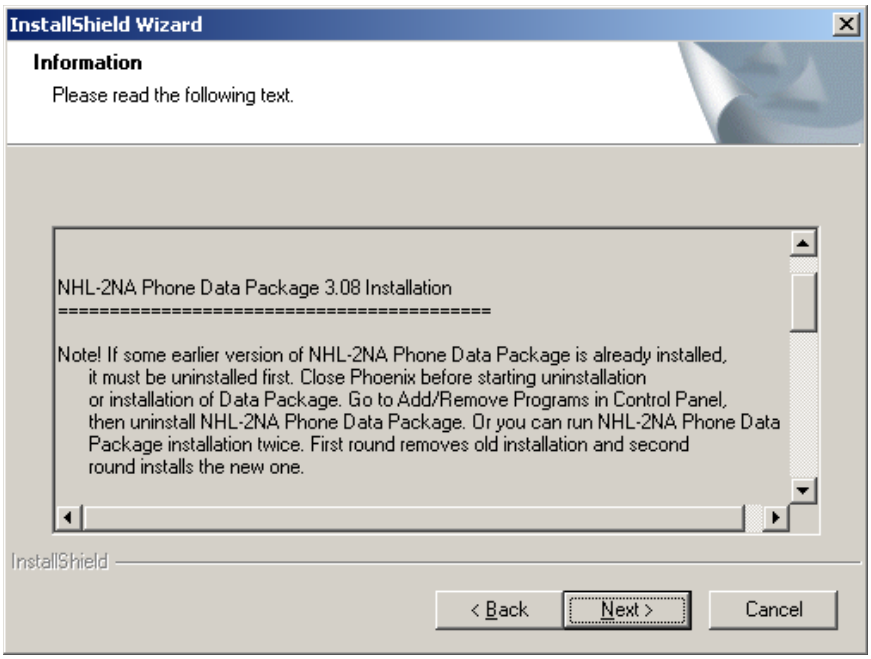
Choose “Next” to continue.


InstallShield Wizard
Welcome to the InstallShield Wizard for NHL-2NA Phone Data Package
The InstallShield® Wizard will install NHL-2NA Phone Data Package version 3.08. To continue, click Next.
< Back
Next >
Cancel

From this view you can see the contents of the Data Package. **Read the text carefully**. There should be information about the Phoenix version needed with this data package. Choose “Next”.


InstallShield Wizard
Information
Please read the following text.
NHL-2NA Phone Data Package 3.08 Installation
==========
Note! If some earlier version of NHL-2NA Phone Data Package is already installed, it must be uninstalled first. Close Phoenix before starting uninstallation or installation of Data Package. Go to Add/Remove Programs in Control Panel, then uninstall NHL-2NA Phone Data Package. Or you can run NHL-2NA Phone Data Package installation twice. First round removes old installation and second round installs the new one.
InstallShield
< Back
Next >
Cancel

Confirm location and choose “Next” to continue. Install shield checks where the Phoenix application is installed and the directory is shown. Choose “Next” to continue.

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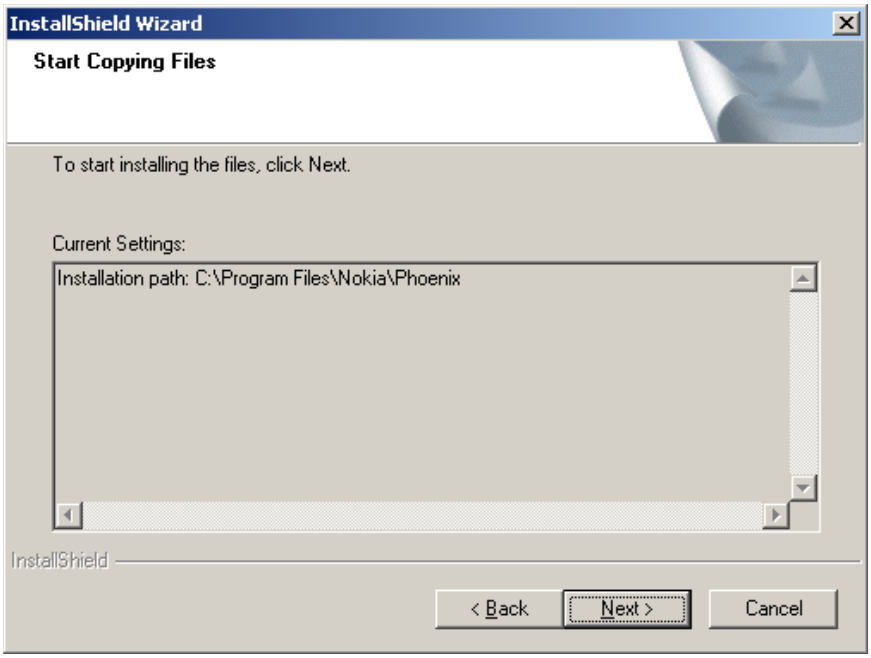
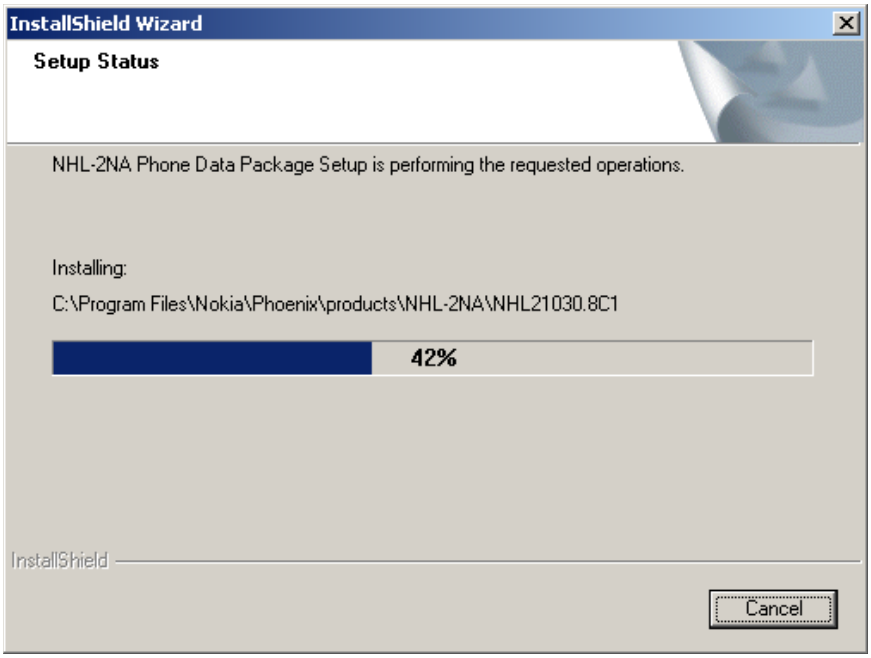


Phone model specific files will be installed. Please wait



Choose "Finish" to complete installation

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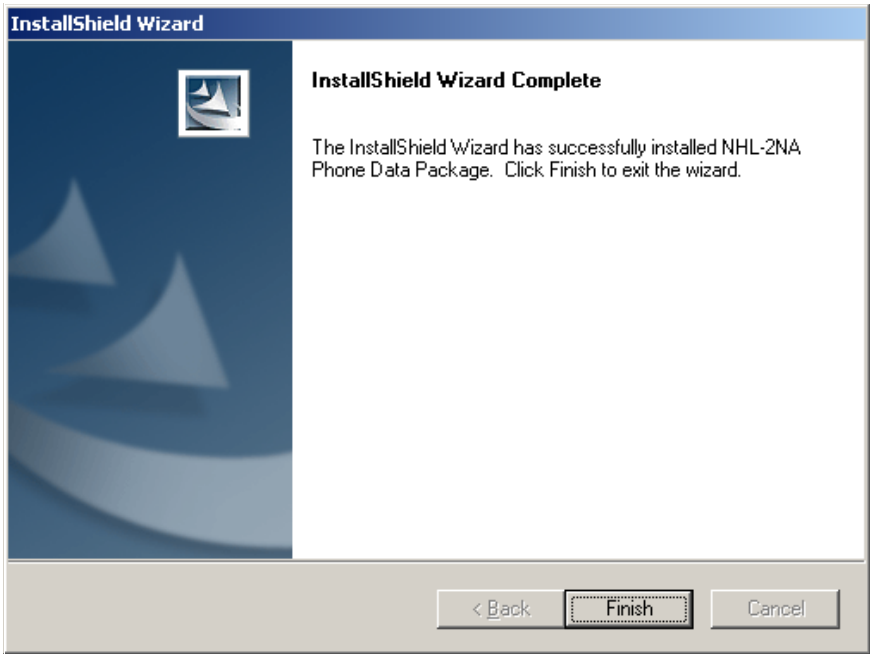

InstallShield Wizard
InstallShield Wizard Complete
The InstallShield Wizard has successfully installed NHL-2NA Phone Data Package. Click Finish to exit the wizard.
< Back
Finish
Cancel

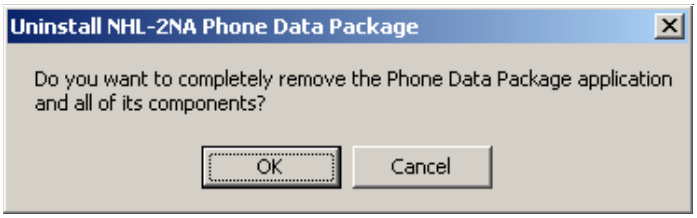
You now have all phone model specific files installed in your Phoenix Service SW.

How to Uninstall Data Package

Uninstallation can also be done manually from Windows Control Panel / Add / Remove Programs/

"NHL-2NA Phone Data Package".

If you try to install the same version of Phoenix Data Package that you already have, you are asked if you want to unistall the version you have on your PC. Answer "OK" to uninstall, "Cancel" if you don't want to uninstall. Older versions of data packages do not need to be uninstalled.


Uninstall NHL-2NA Phone Data Package
Do you want to completely remove the Phone Data Package application and all of its components?
OK
Cancel

Once the previously installed Data package is uninstalled, choose "Finish".

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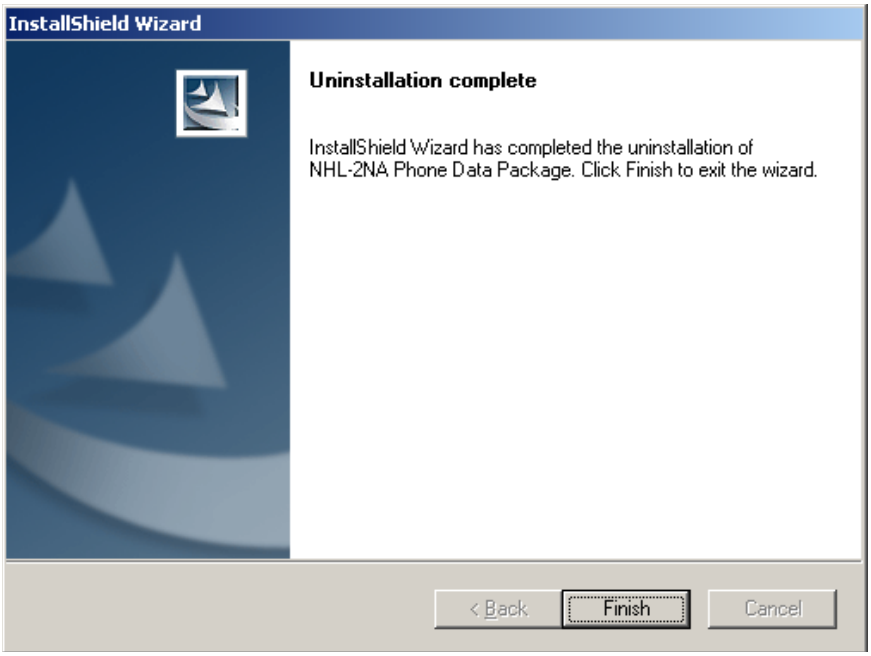
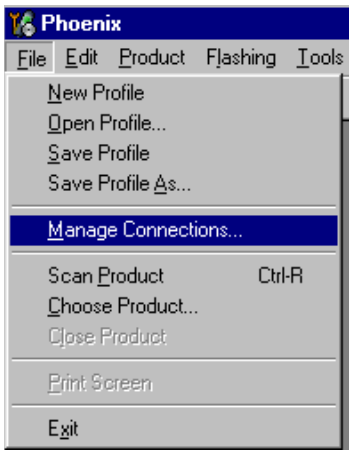

InstallShield Wizard
Uninstallation complete
InstallShield Wizard has completed the uninstallation of NHL-2NA Phone Data Package. Click Finish to exit the wizard.
< Back
Finish
Cancel

Run the *NHL-2NA_dp_v_3.08.exe* again to continue installation from the beginning.

How to Manage Connections

Start Phoenix Service SW and Login.

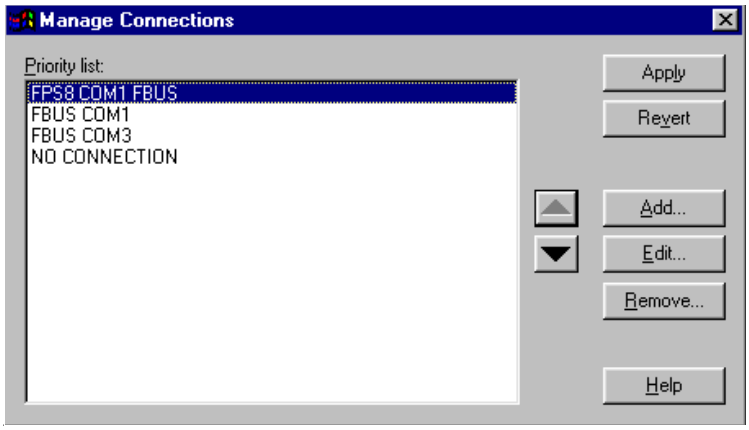
Choose "Manage Connections" From "File" – Menu



Existing connections can be selected, edited, deleted and new ones created by using this dialog.

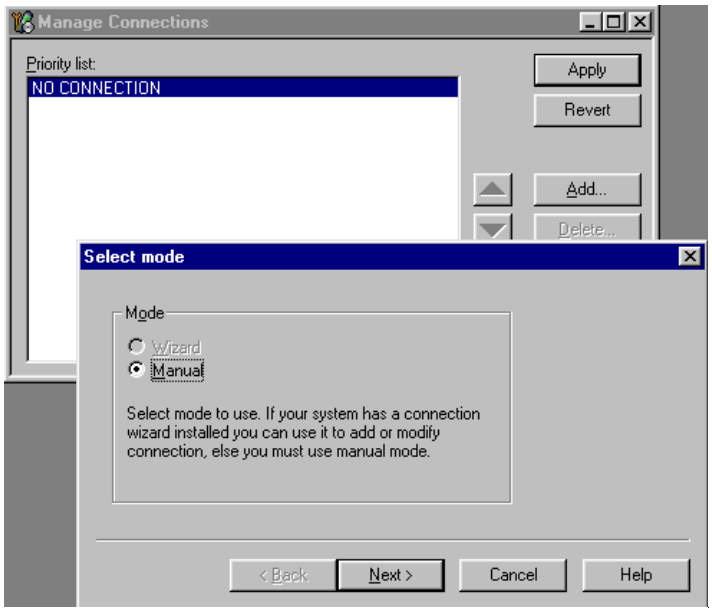
A connection can be created either manually or by using a Connection Wizard.

To add new connection, choose "Add" and select if you want to create it manually or by using the Wizard.



Choose "Next" to continue.

In the next dialogs you will be asked to select some settings for the connection



Manual Settings

A) For **FLS-4 POS Flash Device** choose following connection settings

- **Media:** FBUS
- **COM Port:** Virtual COM Port used by FLS-4 **Please check this always!**

(To check please go to Windows / Control Panel / FLS Virtual Port / Configuration)

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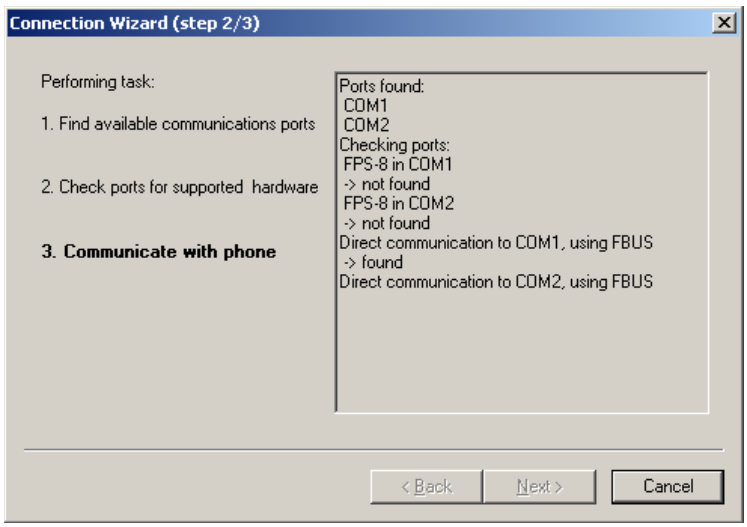
B) For **FPS-8 Flash Prommer** choose following connection settings:

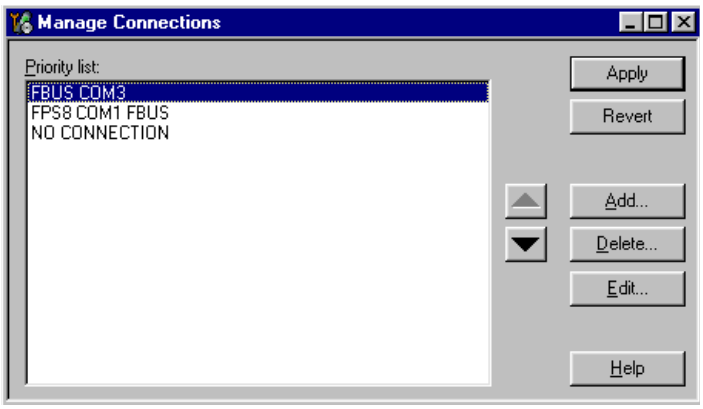
- **Media:** FPS-8
- **Port Num:** COM Port where FPS-8 is connected
- **COMBOX_DEF_MEDIA:** FBUS

Choose "Finish" to complete.

If you use the Wizard, connect the tools and a phone to your PC and the wizard will automatically try to configure the correct connection,

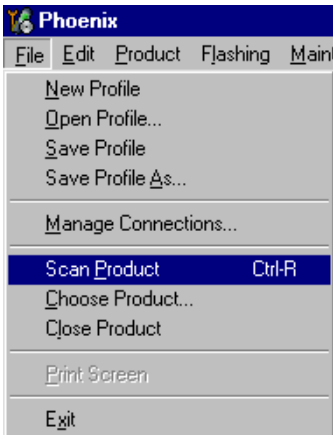


Activate the connection you want to use by clicking it and use up/down arrows to move it on top of the list. Choose "Apply". The connection is now selected and can be used after closing the "Manage Connections" window



Selected connection will be shown on the right hand bottom corner of the screen

To use the selected connection, connect the phone to Phoenix with correct service tools, make sure that it is switched on and select "Scan Product".



When Product is found, Phoenix will load product support and when everything is ready, name of the loaded product support module and its version will be shown on the bottom of the screen.

How to Update Flash Support Files for FPS-8* and FLS-4*

Before Installation

- Install Phoenix Service SW and Phoenix data package
- Download the installation package (e.g. *flash_update_02_06_001.exe*) to your computer (e.g. C:\TEMP)
- Close all other programs
- Run the application file (e.g. *flash_update_02_06_001.exe)* and follow instructions on the screen

Note:

- The flash support files are delivered in the same installation package with Phoenix data package.
- Normally it is enough to install the data package only before updating the FPS-8.
- Separate installation package for flash support files is available, and the files can be updated according to this instruction.

Installing the Flash Support Files

Start by double clicking *flash_update_02_06_001.exe***.** Installation begins.

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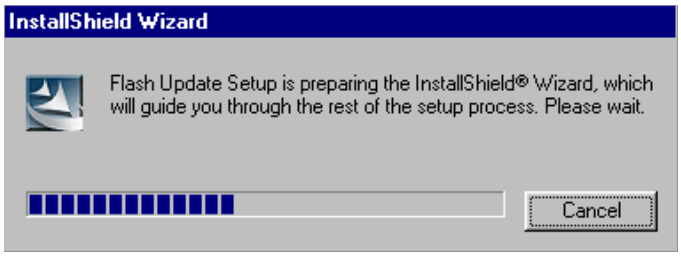
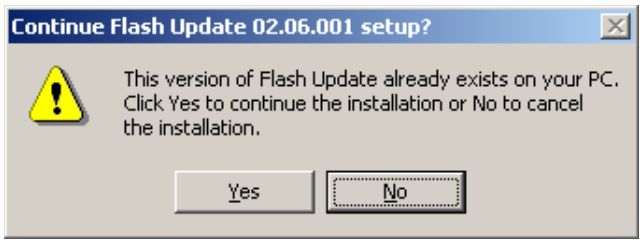
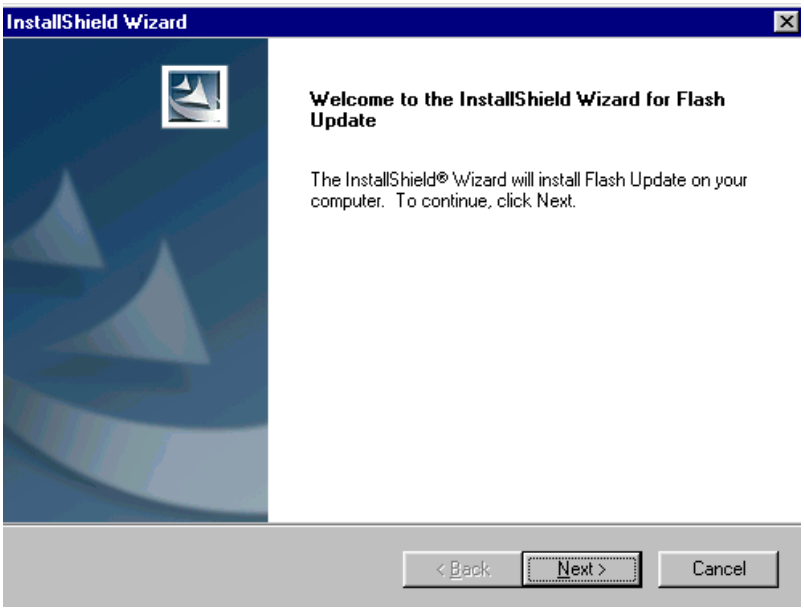

InstallShield Wizard
Flash Update Setup is preparing the InstallShield® Wizard, which will guide you through the rest of the setup process. Please wait.
Cancel

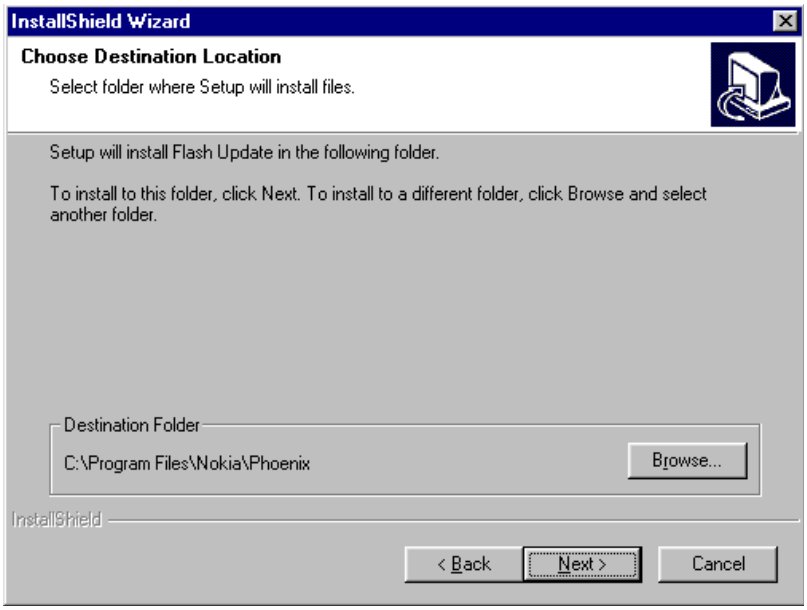
If you already have the same Flash Update package files installed, you need to confirm if you want them to be reinstalled.


Continue Flash Update 02.06.001 setup?
This version of Flash Update already exists on your PC. Click Yes to continue the installation or No to cancel the installation.
Yes
No

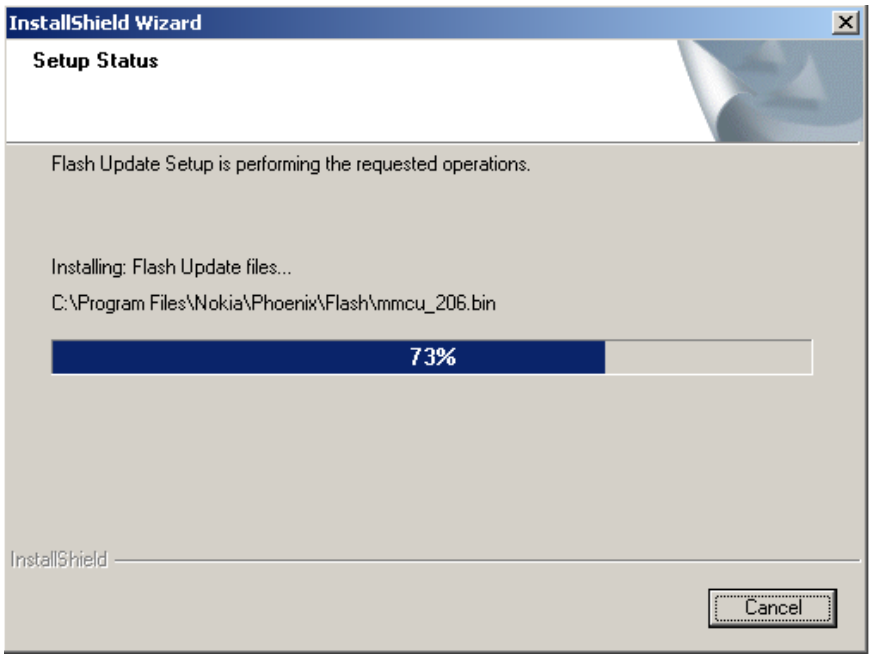
Choose "Next" to continue installation


InstallShield Wizard
Welcome to the InstallShield Wizard for Flash Update
The InstallShield® Wizard will install Flash Update on your computer. To continue, click Next.
< Back
Next >
Cancel

It is **highly** recommended to install the files to the default destination folder *C:\Program Files\Nokia\Phoenix*. Choose "Next" to continue. You may choose another location by selecting "Browse" (not recommended)


InstallShield Wizard
Choose Destination Location
Select folder where Setup will install files.
Setup will install Flash Update in the following folder.
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.
Destination Folder
C:\Program Files\Nokia\Phoenix
Browse...
InstallShield
< Back
Next >
Cancel

Installation continues...



Choose "Finish" to complete procedure.

- FLS-4 can be used right after Flash Update Package is installed.
- FPS-8* must be updated by using Phoenix!

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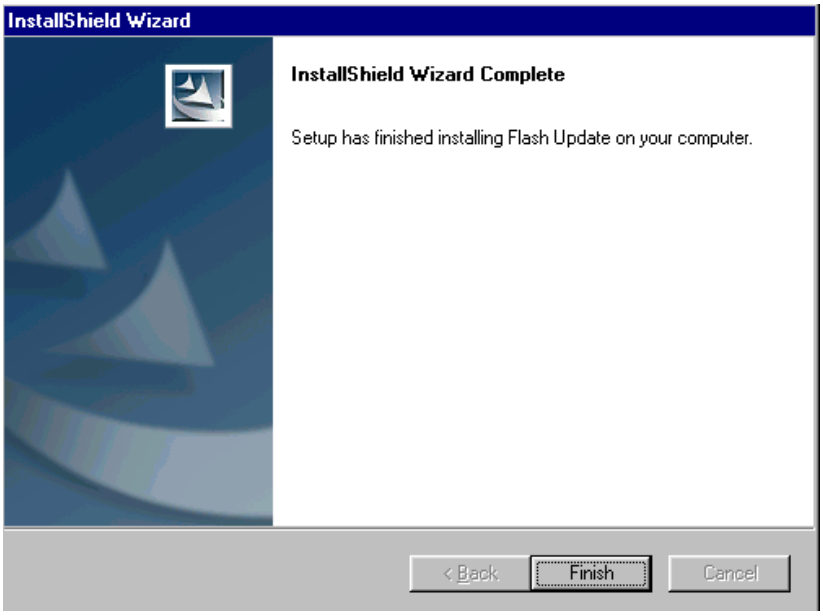
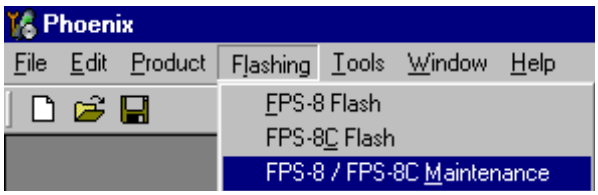


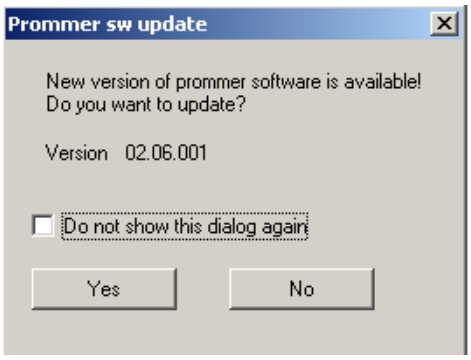
How to Update The FPS-8* Flash Prommer SW

Start Phoenix Service Software.

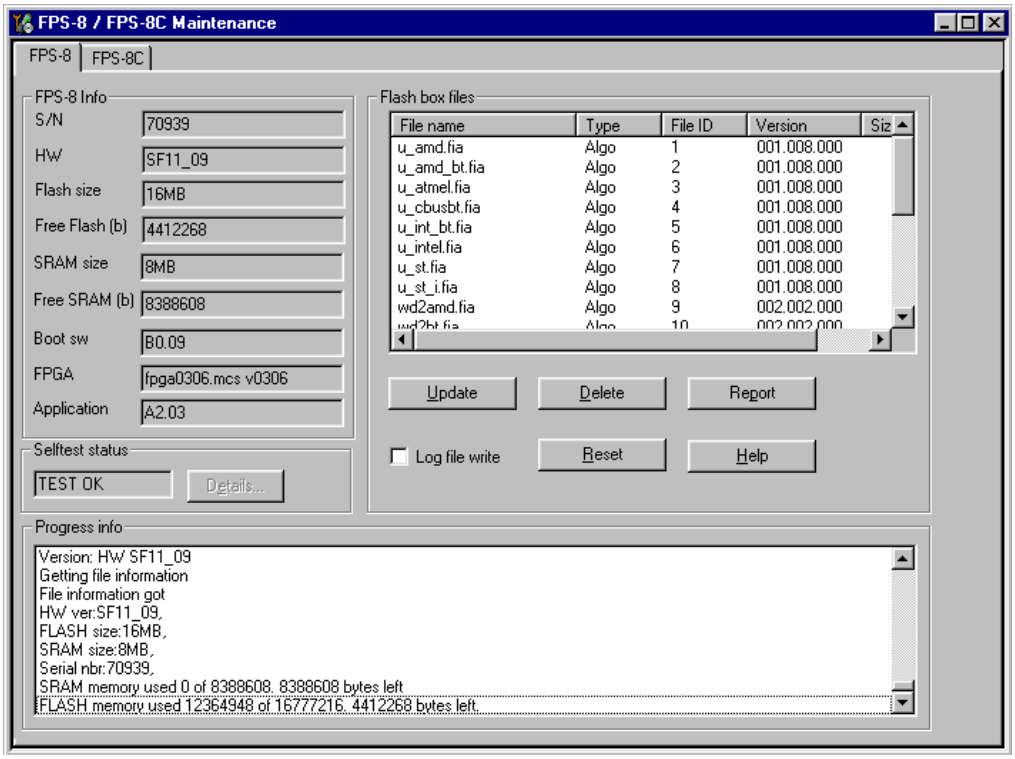
Select "FPS-8 / FPS-8C maintenance" from "Flashing" menu



When new FPS-8 flash update package is installed to computer you will be asked to update the files to FPS-8 Prommer. Select "Yes" to update files.



Update procedure takes a couple of minutes, please wait.



Following dialog appears after FPS-8 is updated.

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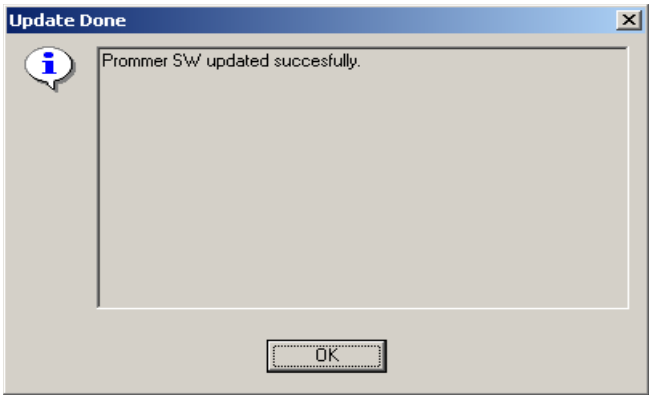
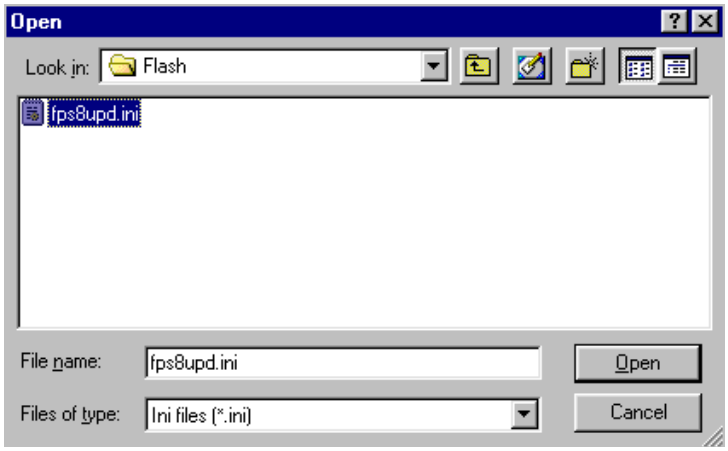


FPS-8 sw can also be updated by pressing "Update" button and selecting appropriate **fps8upd.ini** file

Under *C:\Program Files\Nokia\Phoenix***Flash** - directory



All files can be loaded separately to FPS-8. To do this, just press right mouse button in "Flash box files" window and select file type to be loaded.

More information and help can be found from "Help" dialog

FPS-8 Activation and Deactivation

- Before the FPS-8 can be successfully used for phone programming, it must be first activated.
- If there is a need to send FPS-8 box to somewhere e.g. for repair, box must be first deactivated.

Note: Phoenix should be closed before running BoxActivation.exe.

Activation

Before FPS-8 can be successfully used for phone programming, it must be first activated.

Fill in first "FPS-8 activation request" sheet, in the FPS-8 sales package and follow the instructions in the sheet.

When activation file is received (e.g. 00000.in), copy it to *C:\ProgramFiles\Nokia\Phoenix\BoxActivation* - Directory on your computer

(This directory is created when Phoenix is installed).

Start *BoxActivation.exe* from *C:\ProgramFiles\Nokia\Phoenix\BoxActivation* – directory.

*Fo*llow the instructions in the screen.

1 Choose correct COM Port where your FPS-8 is connected
2 Information about the FPS-8 is shown
3 Choose "Activate the Box"
4 Activation file will be shown, check that it is correct
5 Box will be activated and updated information is shown
6 Turn FPS-8 power off and on to complete activation

Deactivation

Start *BoxActivation.exe* from *C:\ProgramFiles\Nokia\Phoenix\BoxActivation* directory and follow the instructions in the screen.

1 Choose correct COM Port where your FPS-8 is connected
2 Information about the FPS-8 is shown
3 Choose "Deactivate the Box"
4 Confirm Deactivation.
5 Box will be deactivated, please exit BoxActivation
6 Turn FPS-8 power off and on to complete deactivation

JBV-1 Docking Station SW

The JBV-1 Docking Station is a common tool for all DCT-4 generation products.

In order to make the JBV-1 usable with different phone models, a phone specific Docking Station Adapter is used for different service functions.

The JBV-1 Docking Station contains Software (Firmware) which can be updated.

You need the following equipment to be able to update JBV-1 software:

- PC with USB connection
- Operating System supporting USB (Not Win 95 or NT)
- USB Cable (Can be purchased from shops or suppliers providing PC hardware and accessories)
- JBV-1 Docking Station
- External Power Supply 11-16V

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Before Installation

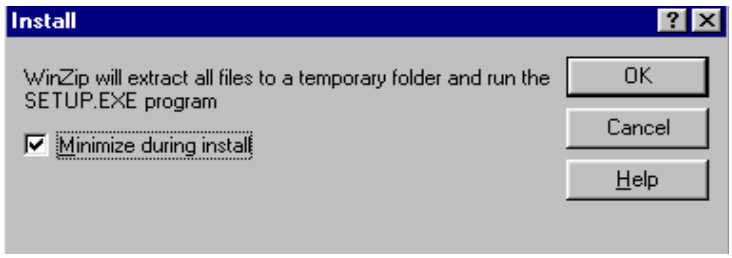
- Download *Jbv1_update.zip* – file to your computer (e.g. C:\TEMP) from your download web site.
- Close all other programs
- Follow instructions on the screen

Installing SW Needed for the JBV-1 SW Update

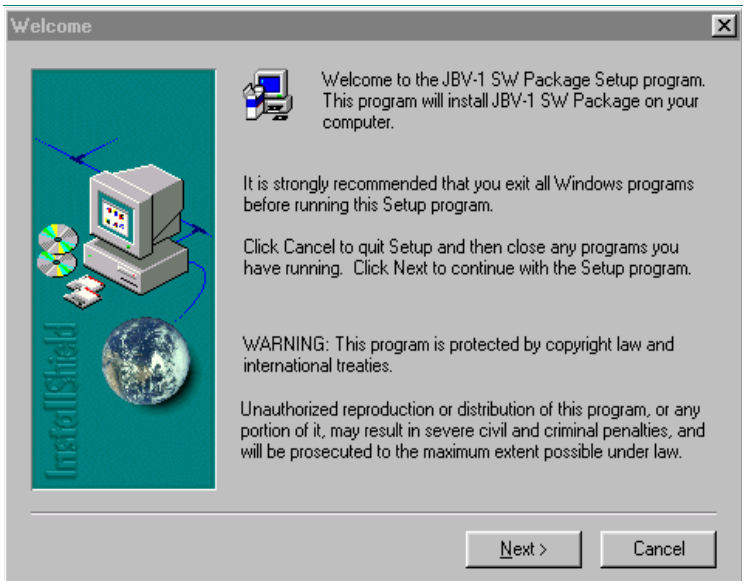
Note: DO NOT CONNECT THE USB CABLE / JBV-1 TO YOUR COMPUTER YET!

Run *Jbv1_update.zip* file and start SW Installation by double clicking *Setup.exe.*

Files needed for JBV-1 Package setup Program will be extracted.

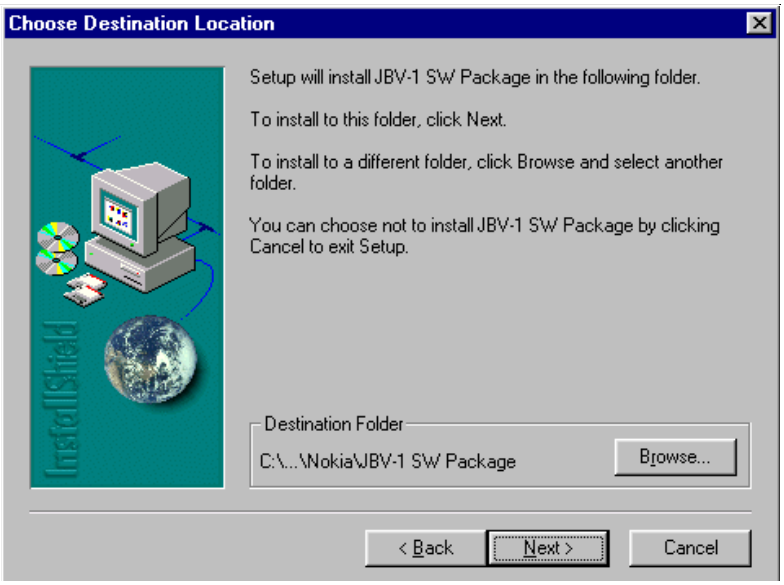


Installation begins, please read the information shown and Choose "Next" to continue

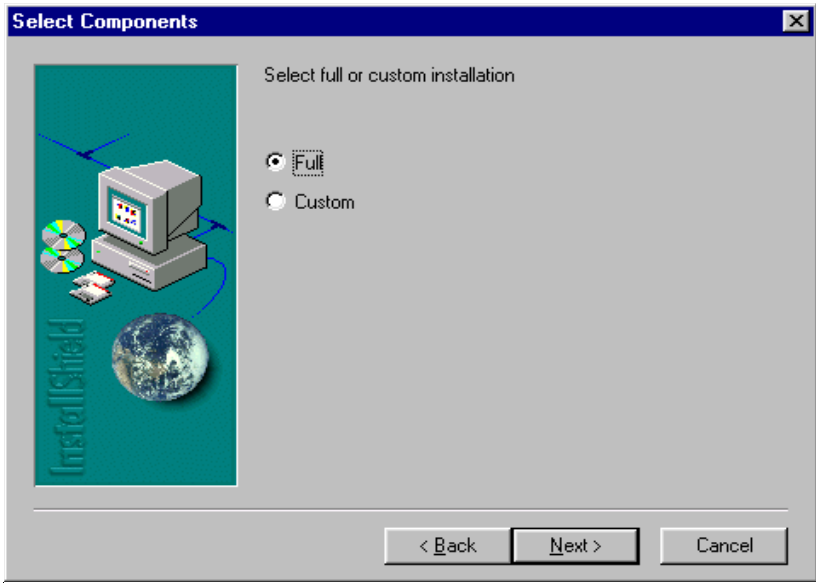

Welcome
Welcome to the JBV-1 SW Package Setup program. This program will install JBV-1 SW Package on your computer.
It is strongly recommended that you exit all Windows programs before running this Setup program.
Click Cancel to quit Setup and then close any programs you have running. Click Next to continue with the Setup program.
WARNING: This program is protected by copyright law and international treaties.
Unauthorized reproduction or distribution of this program, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted to the maximum extent possible under law.
InstallShield
Next >
Cancel

Use suggested destination folder where JBV-1 SW Package will be installed and

Choose "Next" to continue


Choose Destination Location
Setup will install JBV-1 SW Package in the following folder.
To install to this folder, click Next.
To install to a different folder, click Browse and select another folder.
You can choose not to install JBV-1 SW Package by clicking Cancel to exit Setup.
Destination Folder
C:\...\Nokia\JBV-1 SW Package
Browse...
< Back
Next >
Cancel
InstallShield

Select “Full” Installation and choose “Next” to continue



Program Folder will be created. Choose “Next” to continue, Software files will be installed

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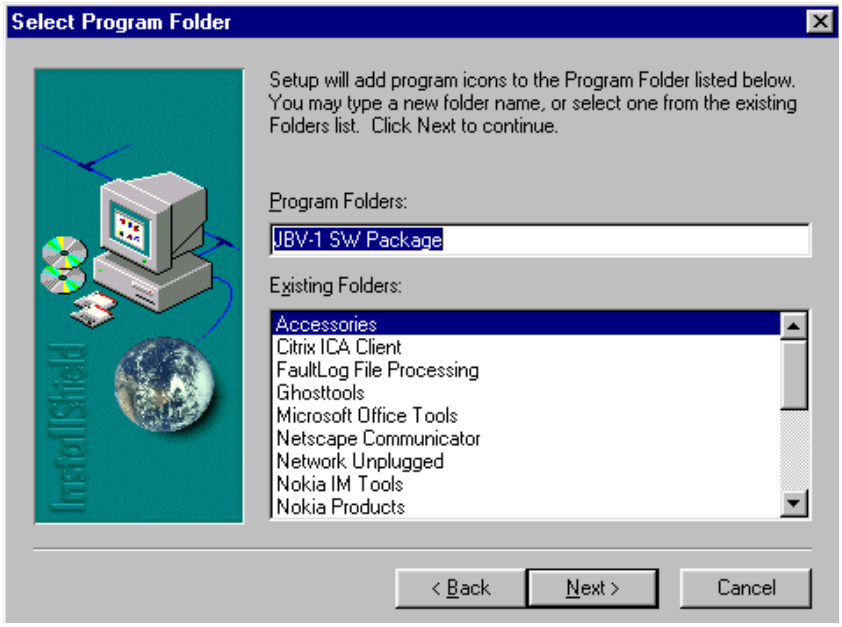
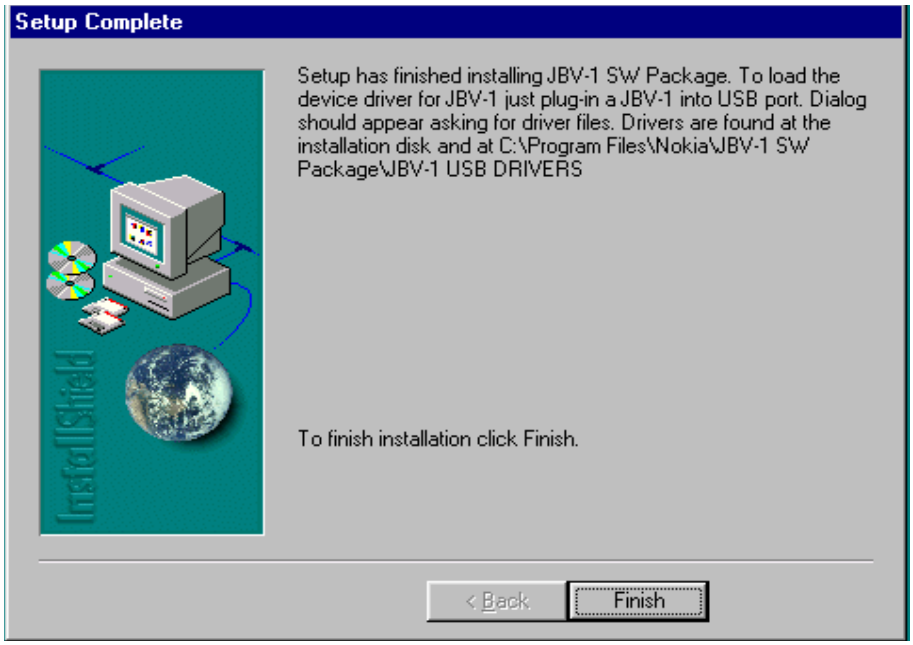


After successful installation, choose "Finish" to complete.


Setup Complete
Setup has finished installing JBV-1 SW Package. To load the device driver for JBV-1 just plug-in a JBV-1 into USB port. Dialog should appear asking for driver files. Drivers are found at the installation disk and at C:\Program Files\Nokia\JBV-1 SW Package\JBV-1 USB DRIVERS
To finish installation click Finish.
InstallShield
< Back
Finish

NOW YOU CAN CONNECT THE USB CABLE / JBV-1 TO YOUR COMPUTER

Connect power to JBV-1 (11-16V DC) from external power supply, then connect USB Cable between JBV-1 USB connector and PC.

Windows will detect connected USB cable and detect drivers for new HW.
Please follow the instructions and allow Windows to search and install the best

Drivers available. After this procedure the actual JBV-1 SW update can begin.

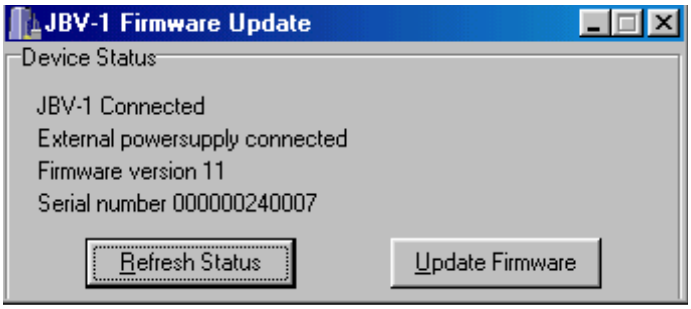
Add New Hardware Wizard
This wizard searches for new drivers for:
USB Device
A device driver is a software program that makes a hardware device work.
< Back
Next >
Cancel

Updating the JBV-1 Docking Station Software

Go to folder *C:\Program Files\Nokia\ JBV-1 SW Package\ FIRMWARE UPDATE* and start JBV-1 Update SW by double clicking *fwup.exe.*

JBV-1 Firmware update starts and shows current status of the JBV-1 connected.

If firmware version read from your JBV-1 is not the latest one available, it needs to be updated by choosing "Update Firmware"



Choose file *JBV1v11.CDE* (example used here is for v 11) and "Open" to update your JBV-1

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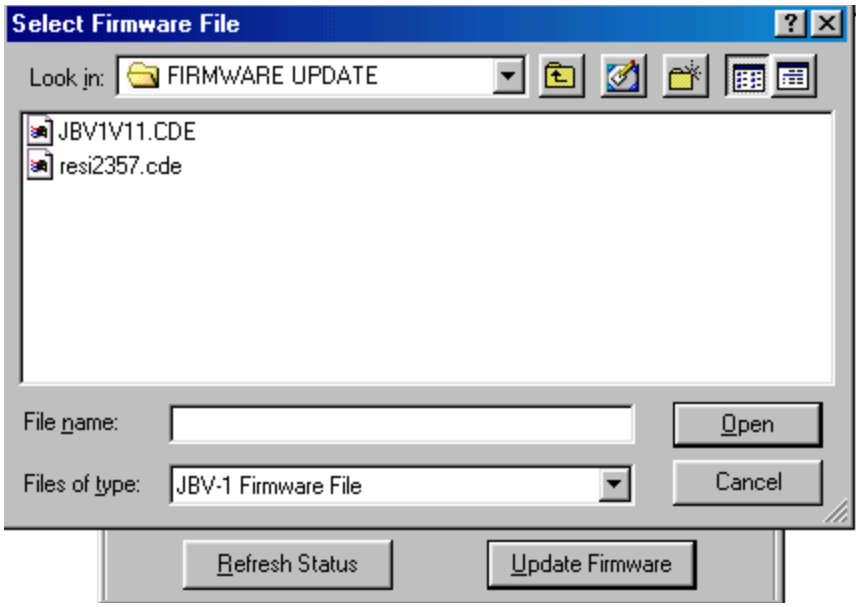
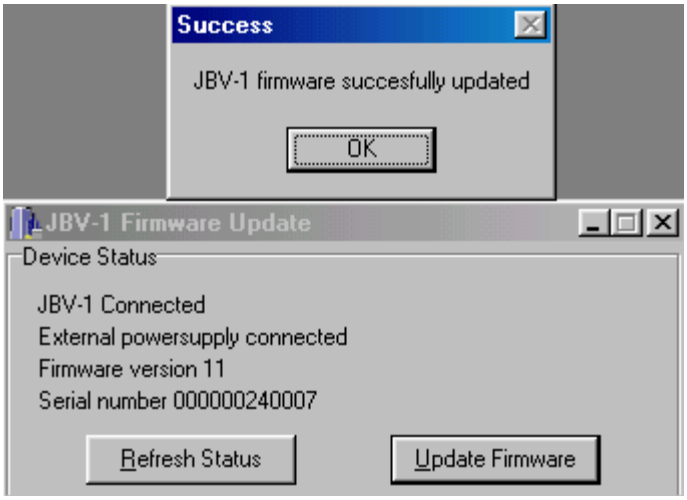


After successful update, current JBV-1 status will be shown. You have now updated the software of your JBV-1 docking station and it is ready for use.



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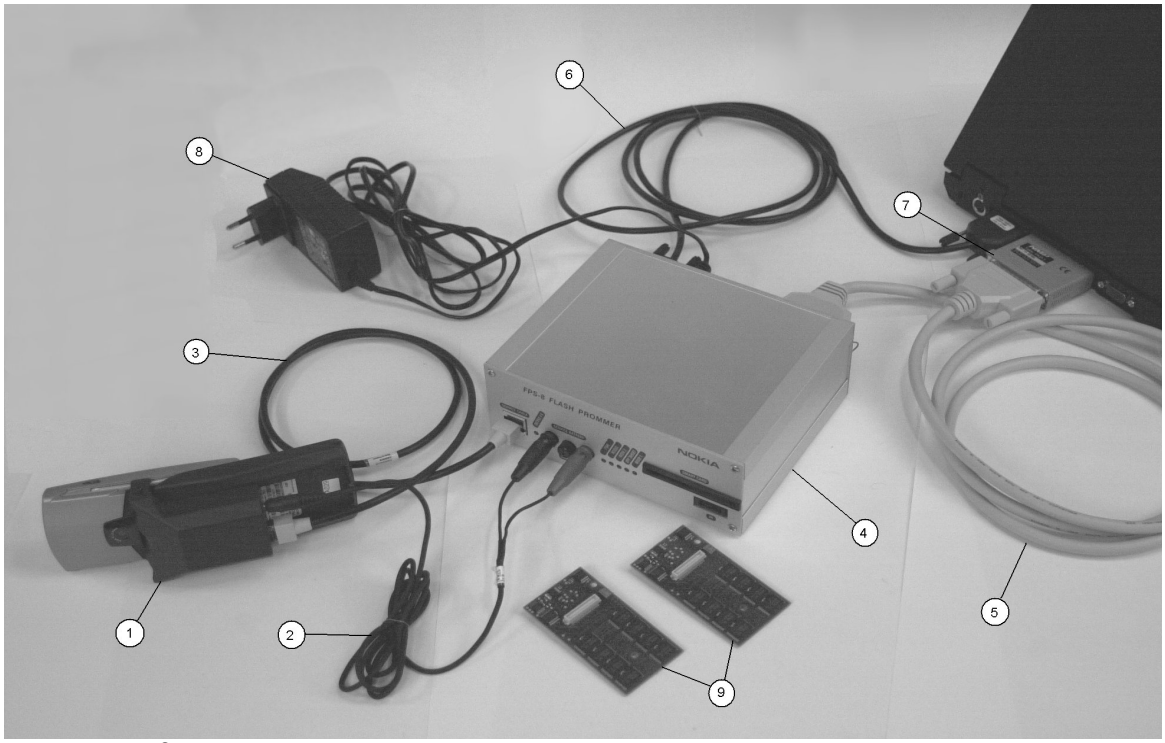
SW update flashing setup

Equipment list

The following equipment is need for NHL-2NA AMS SW update:

Figure 1: Setup for flashing



List of equipment:

Connecting NHL-2NA to PC with FPS-8, list of equipment which is needed:

Item	Description	Type	Code
1	Point of Sales flash loading adapter	FLA-21	0775284
2	power cable	FLC-2	0730185
3	Modular cable	XCS-4	0730178
4	Flash prommer box sales pack	FPS-8	0080321
5	Printer cable	AXP-8, incl in FPS-8 sales pack	
6	D9 – D9 cable	AXS-4, incl in FPS-8 sales pack	0730090
7	Software protection key	PKD-1	0750018
8	AC Charger,	incl in FPS-8 sales pack	0680032
9	SRAM Module (2 pcs needed inside FPS-8)	SF12	0080346 (Code includes one SRAM module)

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Figure 2: SRT-4 Opening Tool, upper part

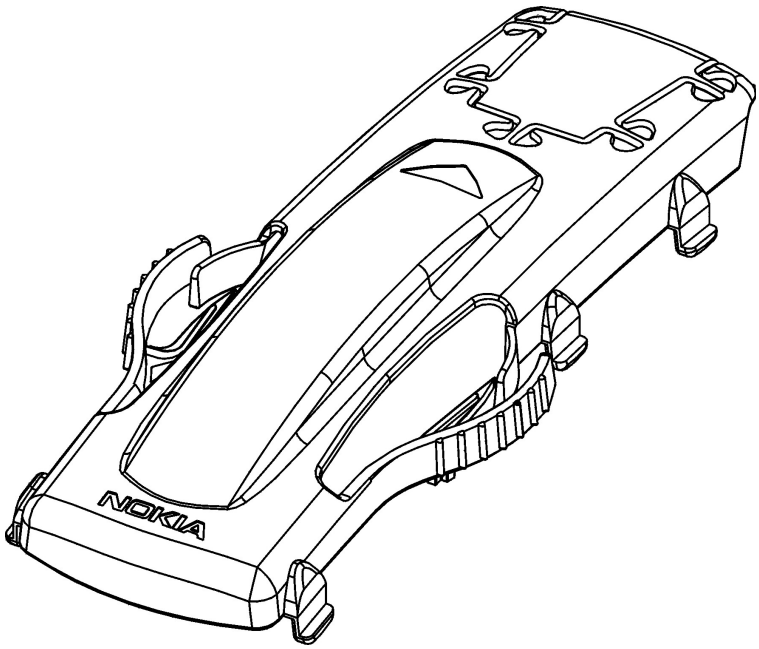
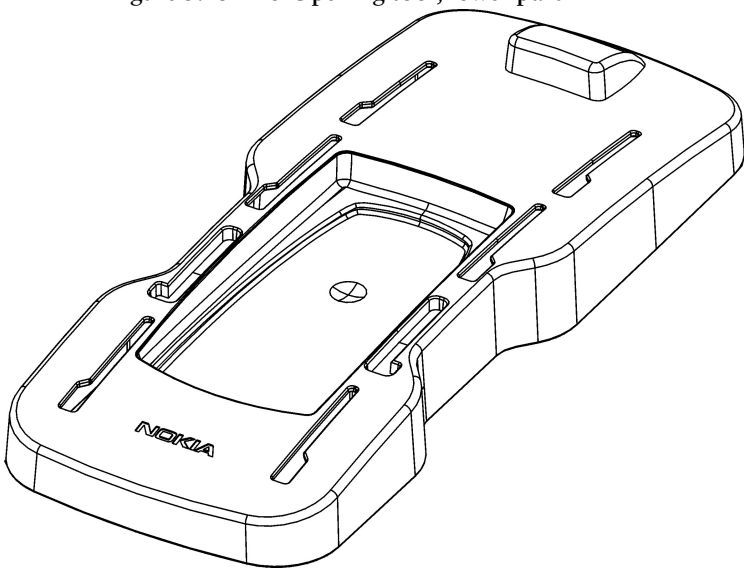


Figure 3: SRT-5 Opening tool, lower part



Item	Description	Type	Code
fig. 2	Opening Tool	SRT-4	0770286
fig. 3	Opening Tool	SRT-5	0770444

Flashing Instructions

Connecting phone to Service accessories

The purpose of this document is to guide you through NHL-2NA SW update in case you have set up the FPS-8 or FLS-4S SW update place according to instructions in previous chapters.

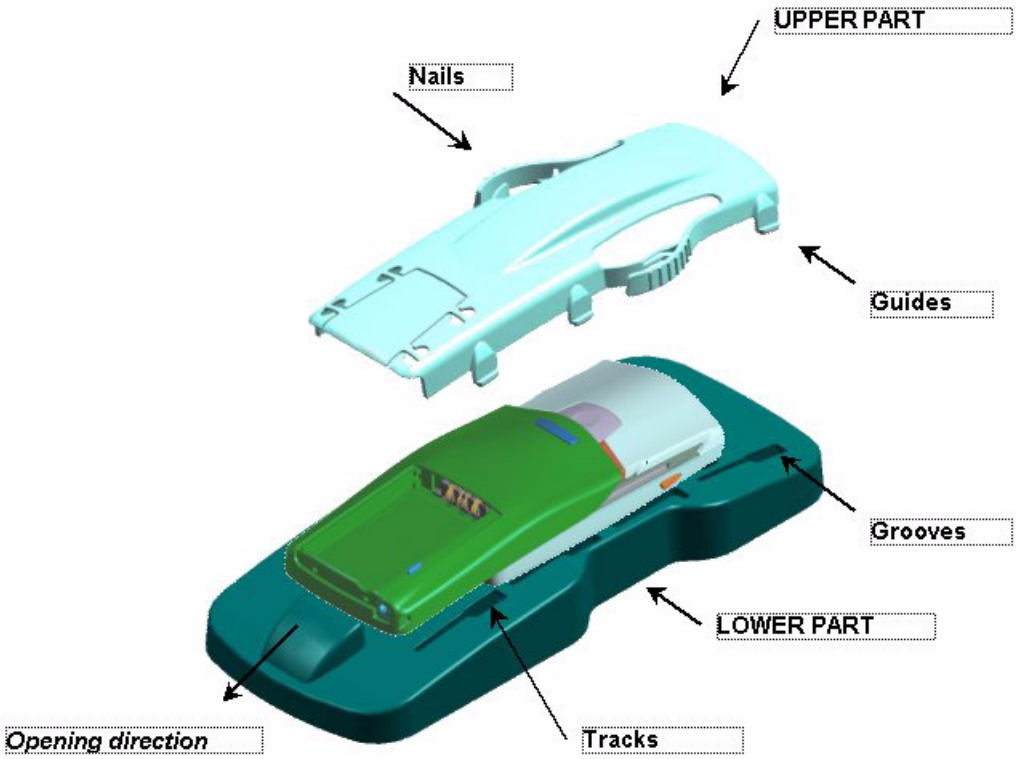
Opening phone for SW update

Nokia 7650 does not have any external data connectors and mechanical solution limits the number lines between keyboard part and transceiver part. To get access to FBUS and MBUS flash connectors Nokia 7650 must be opened with special tools called SRT-4 and STR-5.

Opening procedure is as follows:

7 Place the phone grip opened onto lower tool cavity upside down.
8 Install upper part on the lower part so that the nails are in the phone tracks.
9 At the same time put the upper part guides to the lower part grooves.
10 Push the upper part till end of the grooves.
11 Push the upper part back to the starting point.
12 Remove the upper part.
13 Take the phone out of the tool.

Figure 4: Instructions for use of SRT-4 and SRT-5 opener.



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After this you should be able to see FBUS and MBUS pads as follows:

Figure 5: FBUS and MBUS pads visible when Phone has been opened to service position.

Once you have phone open like this, you can connect it to FLA-21 POS flash adapter. Some precautions should be taken as phone is not in standard use position:

Warnings:

Warning 1. Do not detach the grip part totally from transceiver part if you have not been trained for that. Parts are interconnected with flex foil which can be damaged and after that phone can be repaired only with special tools.

Warning 2. If the grip part jumps slightly out of tracks when you are opening the phone, gently snap grip part back on its place.

Connecting phone to FLA-21 adapter

The following pictures show you the correct way to connect Nokia 7650 Phone to FLA-21 POS flash adapter.

1 First connect battery connector to FLA-21.

Figure 6: Connect battery connector to FLA-21:

2 Snap FLA-21 and Nokia 7650 together so that plastic nails in FLA-21 go into tracks in Nokia 7650.

Figure 7: Connecting FLA-21 to Nokia 7650 so that plastic nails attach firmly into tracks.

3 Connect rest of the cables for FLS-4S or FPS-8 SW update as illustrated earlier.

SW updating

IMPORTANT! Nokia 7650 will most likely have two kinds of data packages.

1 SW releases which have only minor modifications in user data area. These packages do not format user data area. For this reason the user does not need to be read out from the device and does not need to be written back.

2 SW releases which have modifications in user data area. If this kind of SW release needs to be done, it will be clearly indicated in the Technical bulletin and Service bulletin that this package will automatically format user data. With this kind of SW release it is mandatory to backup all user data before SW update and restore it back to customers device after SW update.

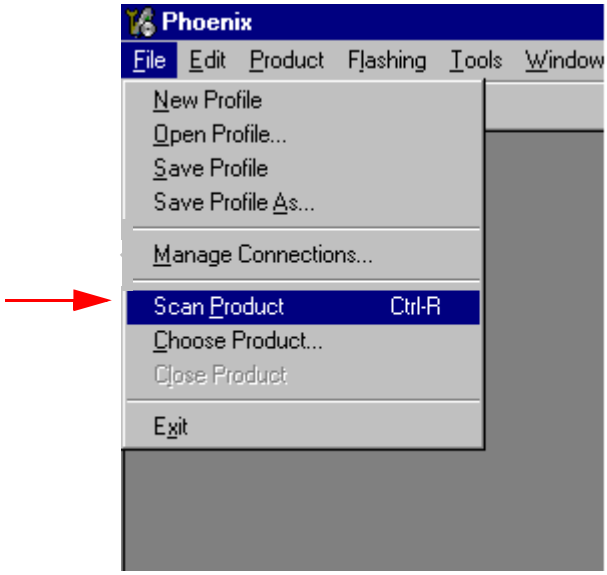
Steps through SW update

Start now Phoenix SW by double clicking **Phoenix icon** on your desktop.

Note! These instructions assume that you have configured buses from Manage Connections menu as advised earlier in this service manual. From Manager connections you can select the correct connection for the Flashadaper FLS-4S or FPS-8.

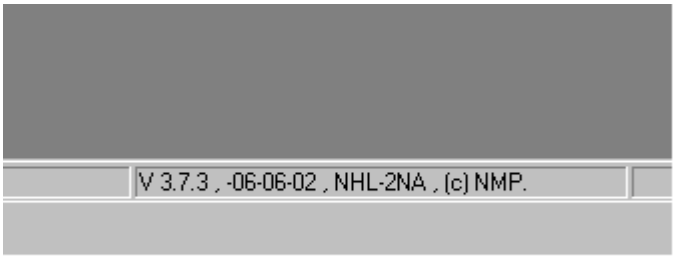
SW starts and shows you 'no product' text in the bottom of the screen. Product needs now to be scanned by choosing File -> Scan product as shown below:

Figure 8: Scanning product with phoenix



If scanning is successful, you will see 'no procut in the bottom of the screen to change into ENOS SW version inside the phone. See below:

Figure 9: Phone replied correctly to Product scan



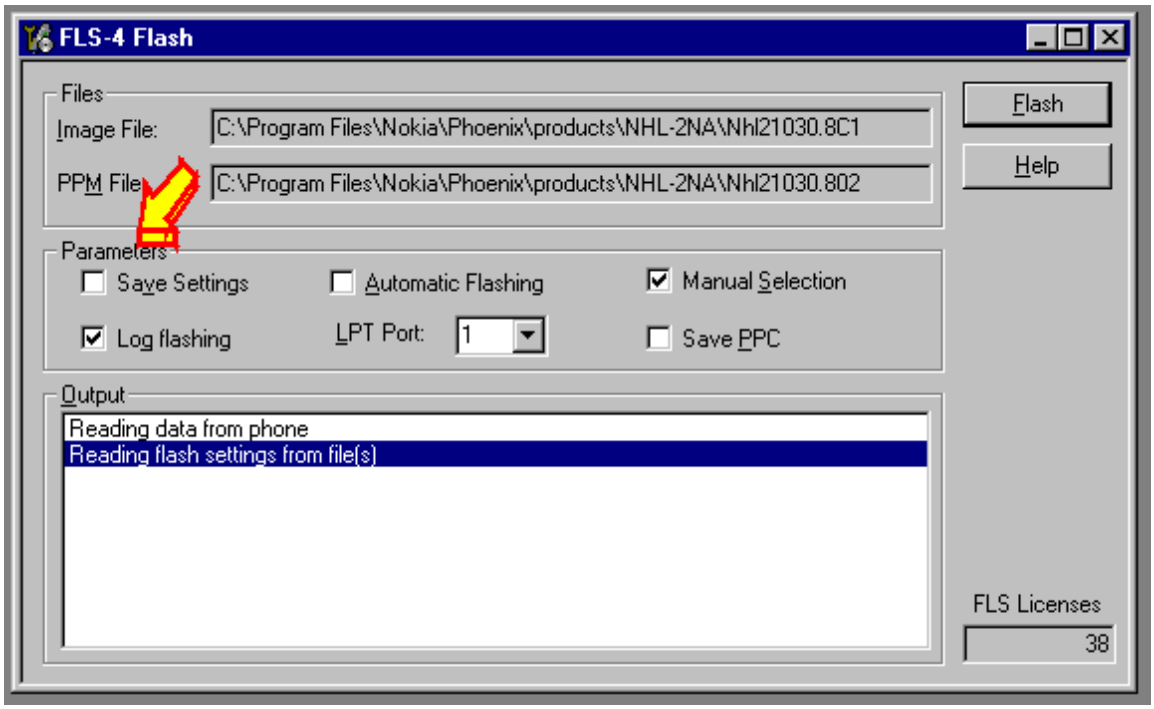
As phone is now correctly connected to FLS-4S or FPS-8 and scanning was successful, You can start SW update from **Flashing** menu.

Choose **Flashing** -> **FLS-4 Flash** (If you are using FLS-4S)

Choose **Flashing** -> **FPS-8** Flash (If you are using FPS-8)

The following window will open:

Figure 10: Choosing correct files for SW update and marking Save settings box if necessary



Phoenix SW now automatically reads the Product code which is stored electronically inside the phone and picks the files which are associated to this product.

IMPORTANT:

Depending on weather the data package you have received automatically erases the user area or not, you have to check save settings box correctly. Otherwise all customer user data will be lost. Automatic erasing will be clearly stated tin the technical bulletin of the SW if this kind of SW will be published.

If Technical bulletin says that used data area is not automatically formatted, do not mark Save settings box.

If Technical bulletin says that data package automatically formats user area, you must mark 'Save Settings' box.

Note: What is user area format? We have thought on behalf of you when user area format must be used when updating SW. If data package automatically formats user area it is clearly stated in the release note of the SW. User area format removes all user generated data from the phone. If data package automatically formats user data, you must save the User data before SW update.

Choose now Flash and you will see the following dialogue box

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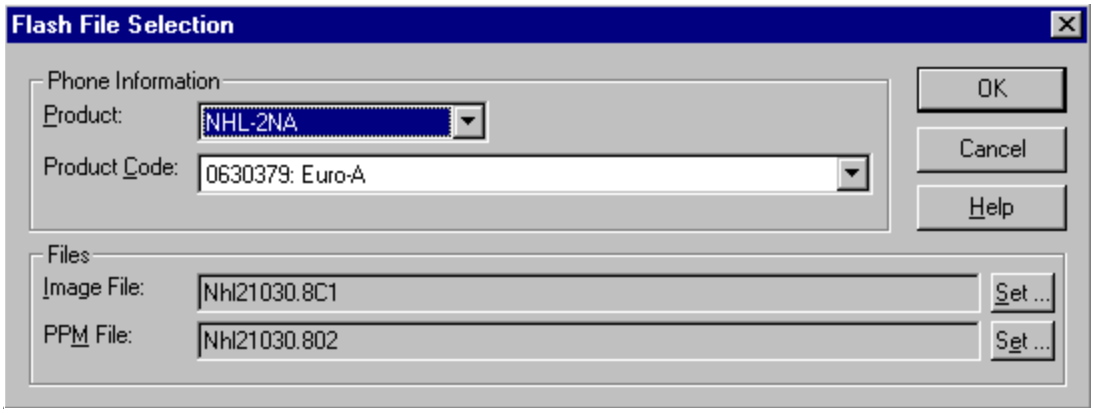
Figure 11: Choosing the correct product code



Usually the electronic product code inside the device gives you the correct files to update into the phone. There is one exception to this rule. Exchange units can be updated with other SW than the one mentioned in the product code field.

Alternatives:

- In normal customer SW update case just press **OK** and SW update starts.
- In case you are updating the exchange unit to give it to the customer, choose from the product code list the variant customer has. It has to be the same which was in the original device of the customer. See Appendix in the end for this document for further info in Exchanging customers phone.

If you chose to save settings you will see the following windows as all customer settings and all user data is saved.

Figure 12: Saving settings progress bar.

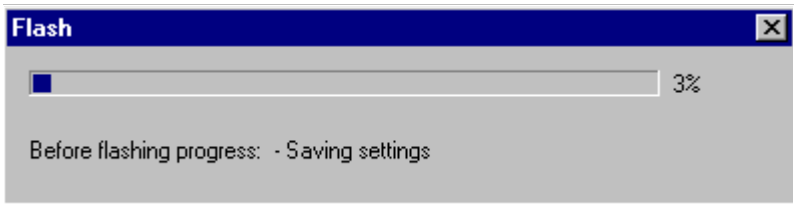
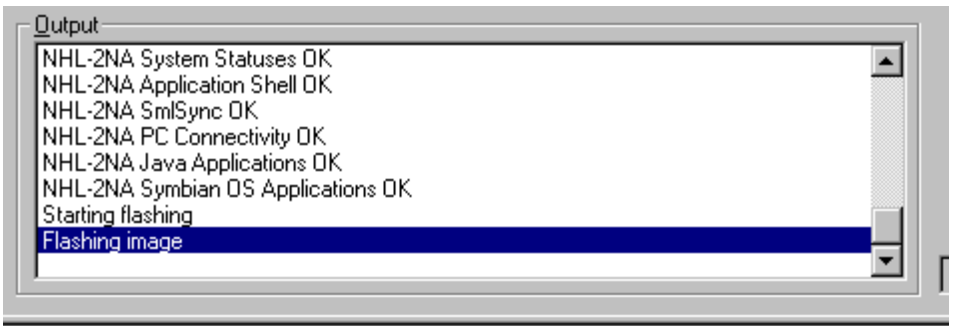
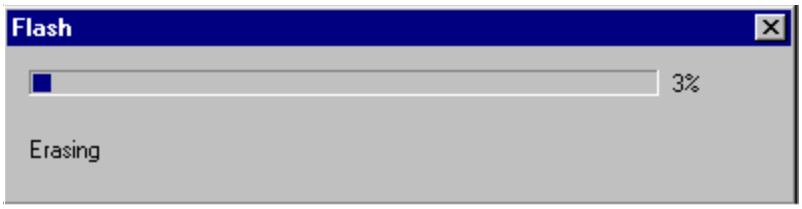


Figure 13: Window where you can see that all used data has been successfully saved.



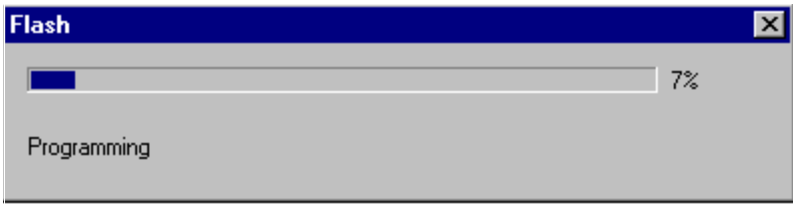
When SW update starts, you can see as Phoenix erases Core package memory area:

Figure 14: Phoenix erasing phone memory



And after this you can see as Phoenix programs new SW package into the phone.

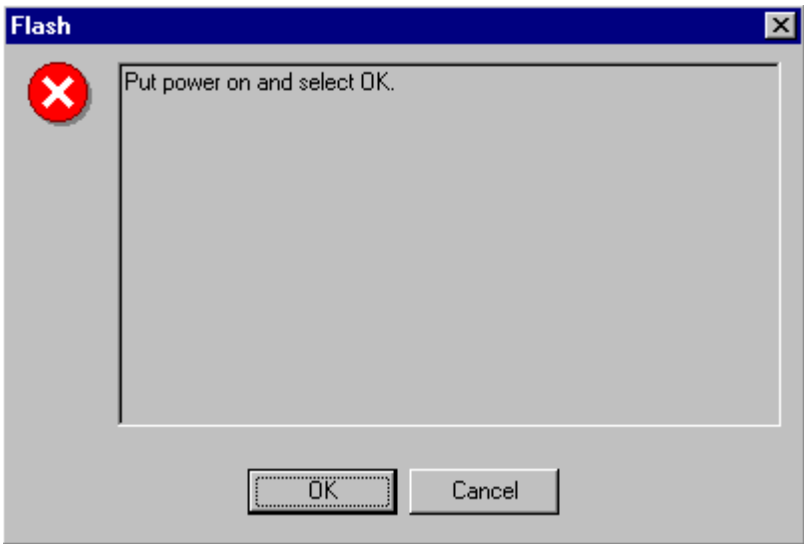
Figure 15: Phoenix programming phone memory



You will see two erases and two programmings as first core package area is erased and programmed and then language package area is erased and programmed.

Programming has ended when you see the following dialogue:

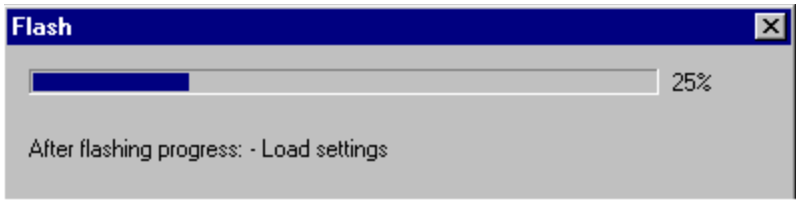
Figure 16: End of programming dialogue.



Now **press phone's power key** and wait until you see 'insert sim card' - text on the phones screen. Click **OK** with mouse. You will see some final operations in Phoenix window rolling on the screen

If you clicked on save settings box when you started SW update, you will now in this stage see as all user settings and all used data is loaded back to phone:

Figure 17: Loading all user settings and all user data back to phone

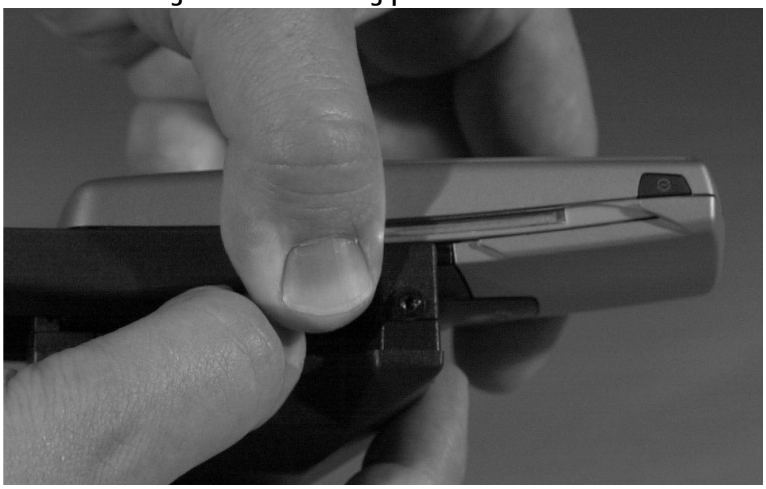


And finally when all files have been loaded back to phone, the following dialogue box appears:

Figure 18: SW update completed successfully.

Press now ok, wait until scrolling on the screen stops and detach you phone from FLA-21 as follows:

Figure 19: Detaching phone from FLA-21



Close now the phone into normal use position and insert SIM card and battery. Boot the phone up and see that all the user data has been restored correctly and check the SW version by typing *#0000# on the telephone application.

Appendix A, Exchanging (Swapping) customers phone

In case customer's phone is so badly damaged that you have to give him/her exchange unit, the following instructions should be followed.

Checking and updating exchange unit

Take exchange unit from its package and see which SW and language version it has. If it does not match the customers phone or SW version inside it is older than the newest one available, update it to the news SW available and update it with the language version which is identical with customers phone. Choose language from product code filed as illustrated in *Fig 7*. earlier in this document.

Reading data from customers phone

Now take customers phone and try to read user data out from it if possible. Use of Phoenix recommended. PC suite can also be used but PC suite does not take backup of Midi ringing tone and java applications. In case customer has those in phone they will be lost during the operations.

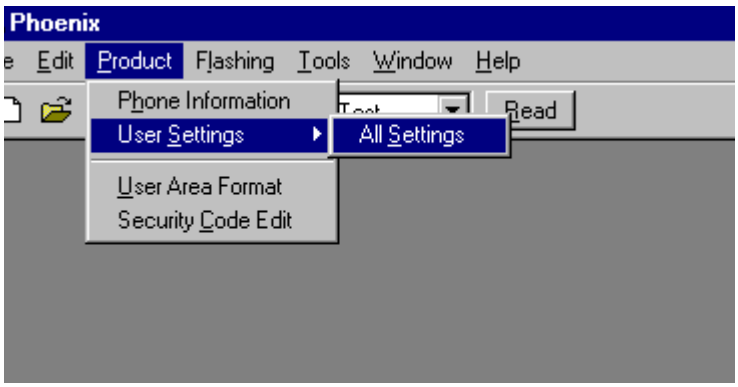
This document describes exchanging only with Phoenix SW.

Reading data from customers phone

Connect customers phone to FLA-21 and phoenix as described earlier in this document.

Scan the product and choose **Product** -> **user settings** -> **All settings** as follows:

Figure 20: Saving user settings from customers phone when exchanging the unit.



The following dialogue will open:

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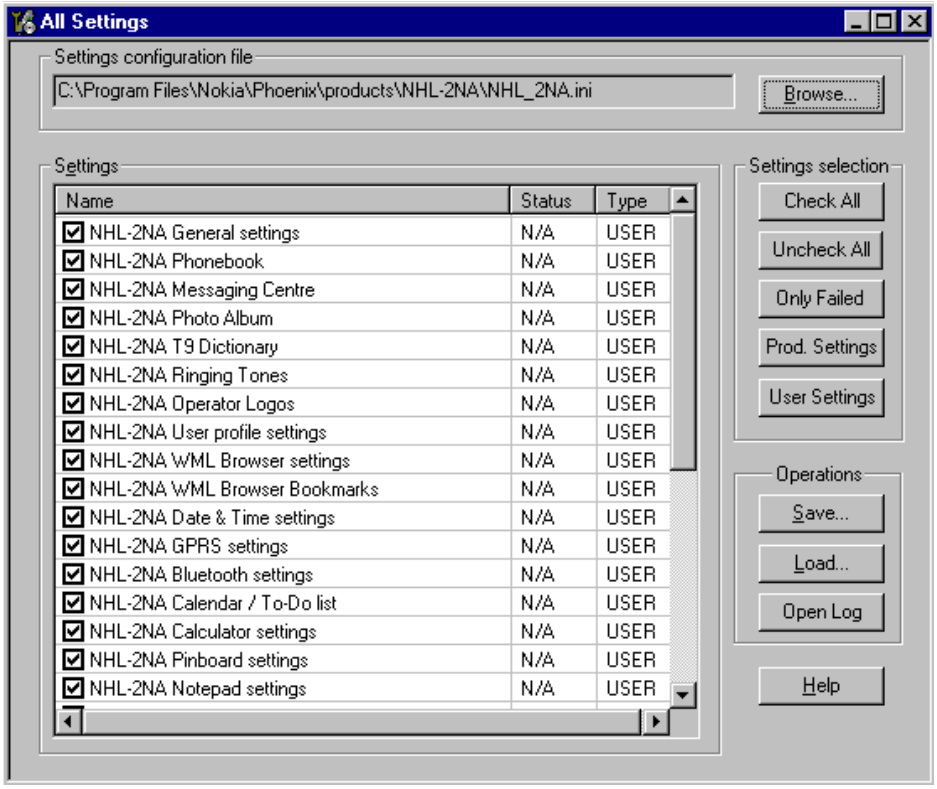
Fig 17. Saving customers settings and used data when exchanging unit.



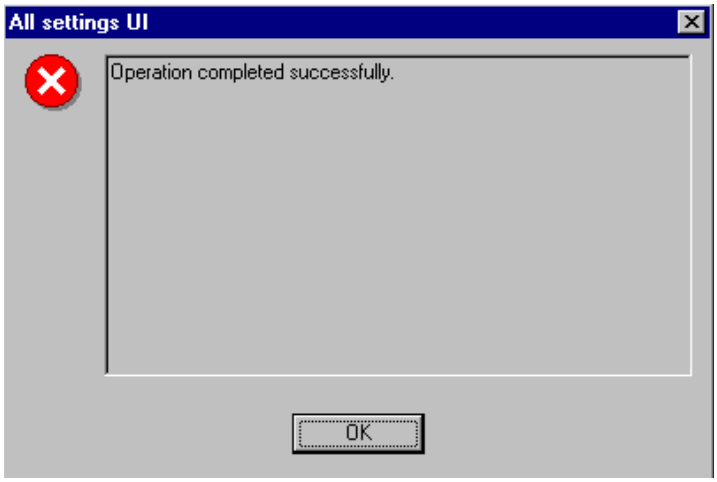
All data is selected by default.

Note! Maximum amount of data in Nokia 7650 is 4 Mbytes and exchange transfer is quite slow. It is advisable to ask customer to empty any unnecessary files from his/hers device before the exchange is started to speed up the process.

Now press '**Save**' button and all data in the customers data is saved to PC hard disk.

When operation has finished, all status field go to OK status and you get the following note:

Figure 21: All user data from customers defective device has been successfully saved to PC hard disk



Now detach defective device from FLA-21 and attach exchange unit with newest SW and correct language version.

Choose **File** -> **Close product** and then **File -> Scan product.**

Choose **User settings -> all settings** as in *figures 16 and 17.*

Now choose Load and load all the data you just red from the defective device to the exchange unit.

When the operation is complete, detach the phone from FLA-21, boot it up with SIM card and battery and see that SW version is the newest one and that all customer data has been correctly restored.

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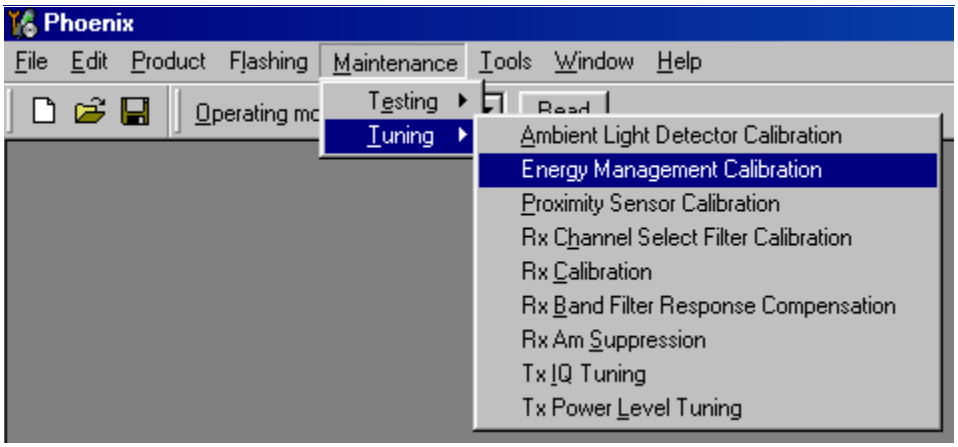
Energy Management Calibration

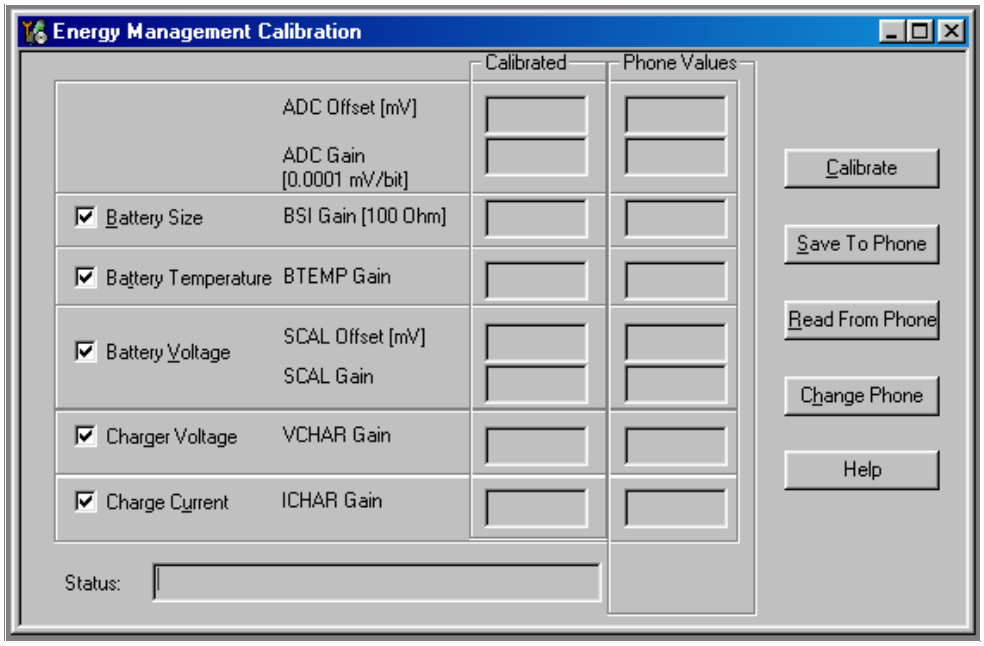
Baseband Tunings

Energy Management Tuning

- External power supply needed
- EM Calibration is used for calibrating Battery and Charger settings of the phone.
- Preparation for EM Calibration:
    - Connect DC Cable SCB-3 between JBV-1 and Vin of Phone for Charger calibration.
    - Connect 12...15 V from Power Supply to JBV-1.
    - NOTE! Check that connection is F-BUS (doesn't work with M-BUS!).
- Select Maintenance => Tuning => Energy Management Calibration



- Energy Management values to be calibrated are checked
- Select "Read from Phone" to show current values in phone memory and to check that the communication with phone works
- Select "Calibrate" to run selected calibrations



Limits for Energy Management Calibration:

	Min	Max
ADC gain	25400	29000
DC offset	-50	50
BSI gain	860	1180
BTEMP gain	1980	2450
VBAT gain	10000	11000
VBAT offset	2300	2700
VCHAR	58000	62000
ICHAR	4000	4800

- If values shown are within limits select "Save To Phone" to save values to phone.
- NOTE! Only values of checked tunings (Battery size, Battery Temperature etc....) will be saved.
- Close the "Energy Management Calibration" – dialog to end tuning

Sensor calibration instructions

Proximity Detector Calibration

General

Three parameters are calibrated in proximity sensor calibration: Gain, Detection threshold and Fault detection threshold. Calibration must be done always when emitter, receiver, AEM or proximity optics have been replaced.

Calibration is done in two phases. First detection threshold and gain are calibrated. If

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this is done successfully, fault detection threshold is calibrated.

Start values for calibration are defined by NMP. Using correct start values is necessary for successful calibration. At Nokia Mobile Phone's request, Start values can be changed by editing nhl2pxm.ini file in \Phoenix\Products directory. Start values in nhl2pxm.ini can be taken into use by pressing Use defaults-button.

Tools

- MJF-7 with 20% diffuse reflectance target.

Note: In troubleshooting purposes the calibration can be done also in other test jigs and without standard target, but those calibrations never replace calibration with MJF-7.

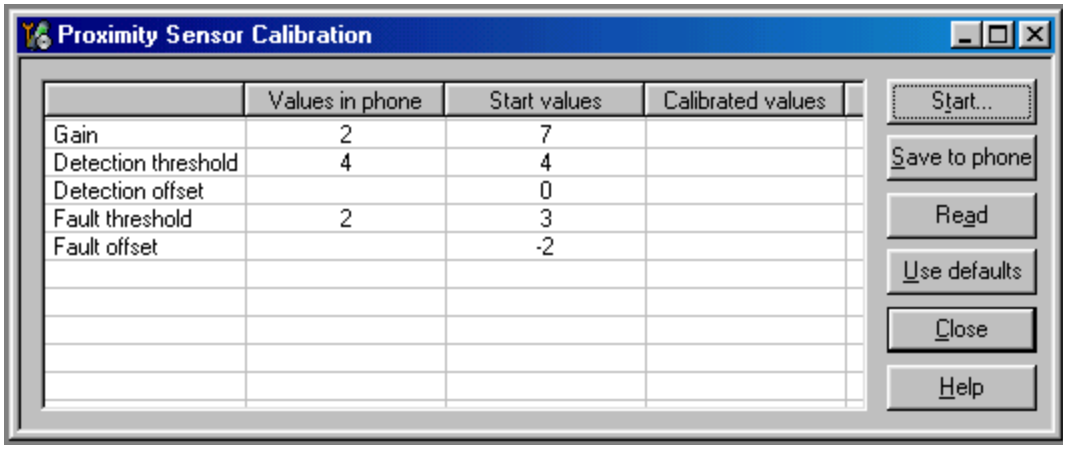
- Phoenix with 'Proximity Sensor Calibration'-tool.
- The figure below shows the correct setup for proximity detector calibration.

Figure 1: Proximity Detector Calibration Setup

Calibration

- Start 'Proximity Sensor Calibration'-tool: Maintenance -> Tuning -> Proximity Sensor Calibration. Values in the phone permanent memory are read automatically from phone memory, when calibration tool is started.

Figure 2: Proximity Sensor Calibration dialog with start values



The Proximity Detector Calibration Setup figure shows the Proximity Sensor Calibration tool. Gain, Detection threshold, and Fault threshold in the left column are the values in phone permanent memory. Middle column shows start values that are used in the calibration. They are defined by Nokia Mobile Phones, and should not be changed without Nokia Mobile Phones request.

Note! Values in the Figure 2 are not correct after 06/2002.

- Default start values (06/2002) are Gain 7, Detection threshold 4, Detection offset 1, Fault threshold 3 and Fault offset –2.

- Press Start to start the calibration, and follow instructions. At first Phoenix ask you to place the reflectance target above the proximity lenses. Calibration may be done only with 20% reflectance target (size 50mm*50mm, distance from the lenses 50mm). Use only Nokia accepted calibration target that is provided with MJF-7.

- After successful detection/gain calibration Phoenix asks you to remove the calibration target for fault detection threshold calibration. Make sure, that there is at least 1500mm free space above the phone.

- If something has gone wrong in the calibration, return message gives valuable information for error hunting. From Help menu you can find some indication of the fault, more detailed information is found in the baseband troubleshooting document. In the figure Error message after failed calibration you can see the error message after failed fault threshold calibration, it is FAULT_OVER_LIMIT.

- Message after successful calibration is in the figure Return message when calibration was successful.

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Figure 3: Error message after failed calibration

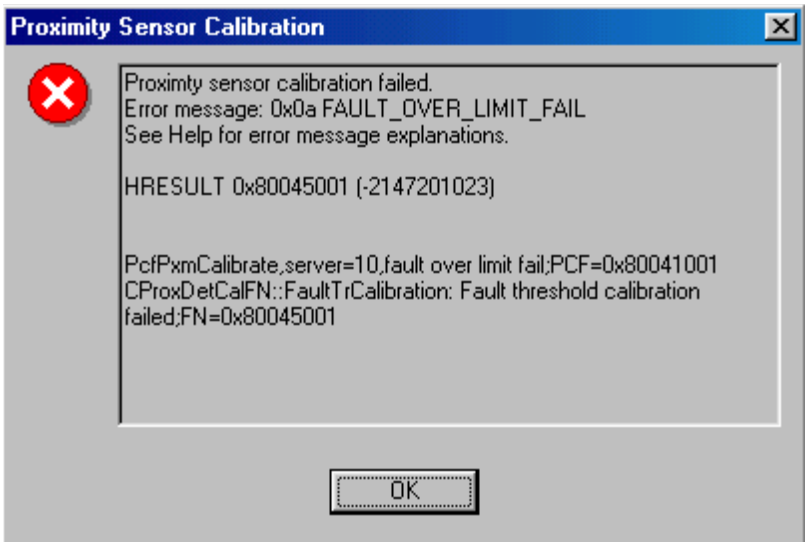
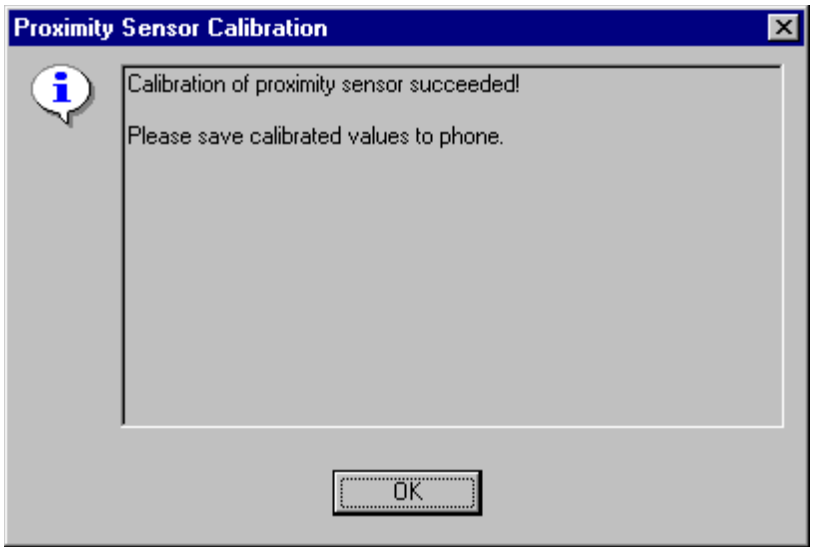
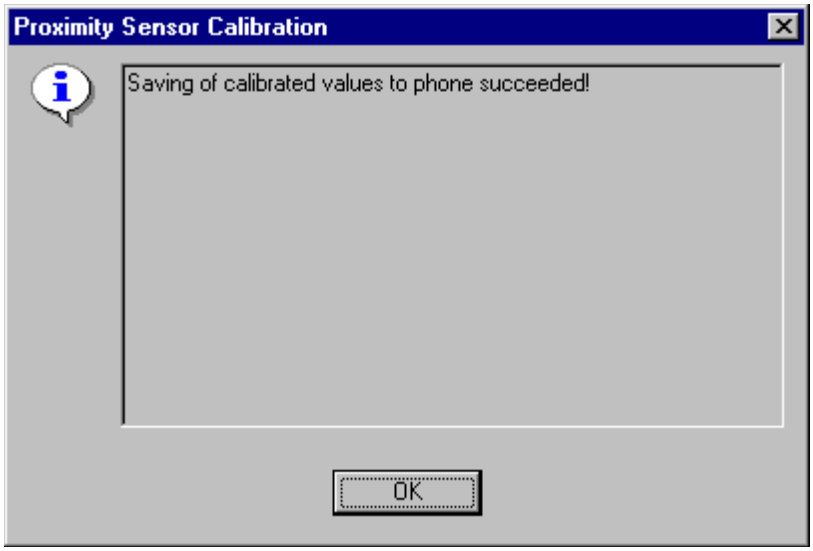


Figure 4: Return message, when calibration was successful



- Calibration result is shown in the right column of Proximity Sensor Calibration dialog (Figure Proximity Sensor Calibration dialog with start values). Press 'Save to phone' to save calibration result. After successful saving of calibrated values, you get the message in Figure Return message after successful saving of calibration result. With 'Read' button you can double-check that saving the values has succeeded. Note that offset values defined in the middle column are now added to the detection threshold and fault detection threshold.

Figure 5: Return message after successful saving of calibration result



Ambient Light Detector Calibration

General

Ambient Light Detector calibration is based on comparison between reference value and ADC-reading from the calibrated phone. Calibration is done by illuminating the phone with a white LED light source, TDS-11. Reference value is read from a Golden Phone.

Reading reference value with a Golden Phone is called System Calibration. Most important for successful calibration is, that System Calibration is done in the same lightning conditions, where calibration is done. To make sure, that lighting conditions are identical, calibration must be done in darkness. This can be achieved for example by covering MJF-7 and TDS-11 with a cardboard box.

Only if the Golden Phone is not available, a default reference value that is provided with TDS-11 can be used.

Tools

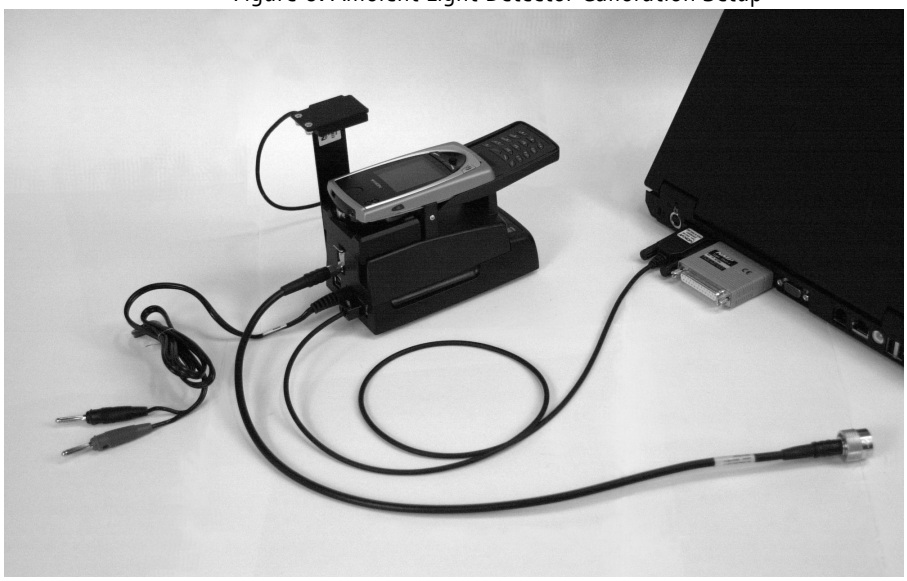
- MJF-7 with white LED light source (TDS-11 Calibration lamp, 0770440).

Note that the supply voltage to JBV-1 has to be precisely 14.0 Volts. This has effect on TDS-11 brightness despite the 12 V regulation in TDS-11 output.

- Phoenix with 'Ambient Light Detector Calibration'-tool. Picture of calibration tool is in the figure Ambient Light Detector Calibration Dialog.

- The Figure 7 Ambient Light Detector Calibration Setup shows the Ambient Light Detector Calibration Setup.

Figure 6: Ambient Light Detector Calibration Setup



System Calibration

System calibration must be done always, when:

- Calibration light source has been changed
- After ~1000 calibrations or once a month

System calibration is done with a Golden Phone provided by NMP. Only if the Golden Phone is not available, default reference value provided with TDS-11 can be used.

- 'Start Reference Value' tells the reference value that has been read from a Golden Phone. System calibration changes this value, and it needs to be done if lighting conditions have changed. When you are doing the calibration for the first time, start reference is 0 and system calibration has to be done.

System calibration procedure is following.

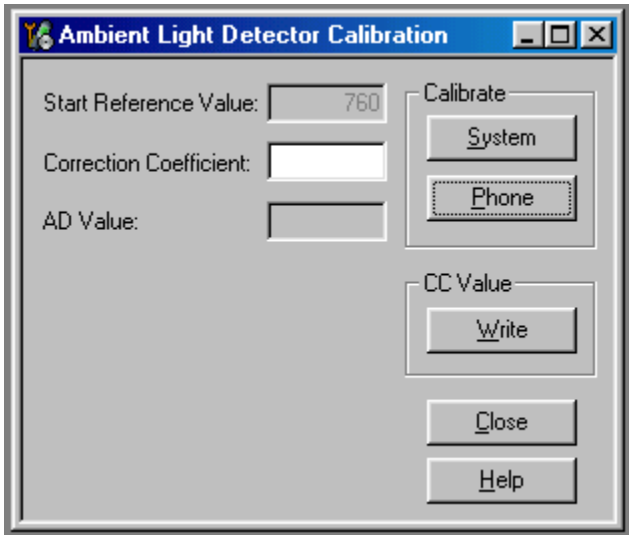
- Attach Golden Phone to the MJF-7.
- Start 'Ambient Light Detector Calibration'-tool: Maintenance -> Tuning -> Ambient Light Detector Calibration
- Press 'System Calibration' and follow instructions. Choose System Calibration with Golden Phone always, when Golden Phone is available.
- New reference value will be used until next System Calibration. Calibration lightning conditions may not change after this.
- Only if Golden Phone is not available, choose 'Change Reference Value manually'. Then enter the default reference value that is provided with TDS-11 light source.

Calibration

- Save calibration values from phones permanent memory before starting calibration.

- Start 'Ambient Light Detector Calibration'-tool: Maintenance -> Tuning -> Ambient Light Detector Calibration.

Figure 7: Ambient Light Detector Calibration Dialog



- Place calibrated phone to the MJF-7 and press 'Phone'. If the calibration was successful, calibrated value is shown in the middle box 'Correction Coefficient'. Press 'Write' to save the value to the phone. AD value in the lowest edit box is just for your information.

- CC is 1, if calibrated phone behaves exactly like the Golden Phone. Normally the value is between 0.75 and 1.25. If value is not between 0 and 8, you will get an error message.

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RF-Tuning Instructions (with Phoenix)

General

RF tunings should be made in the same order as shown in this section.

If baseband tunings are needed, they should be made before the RF tunings

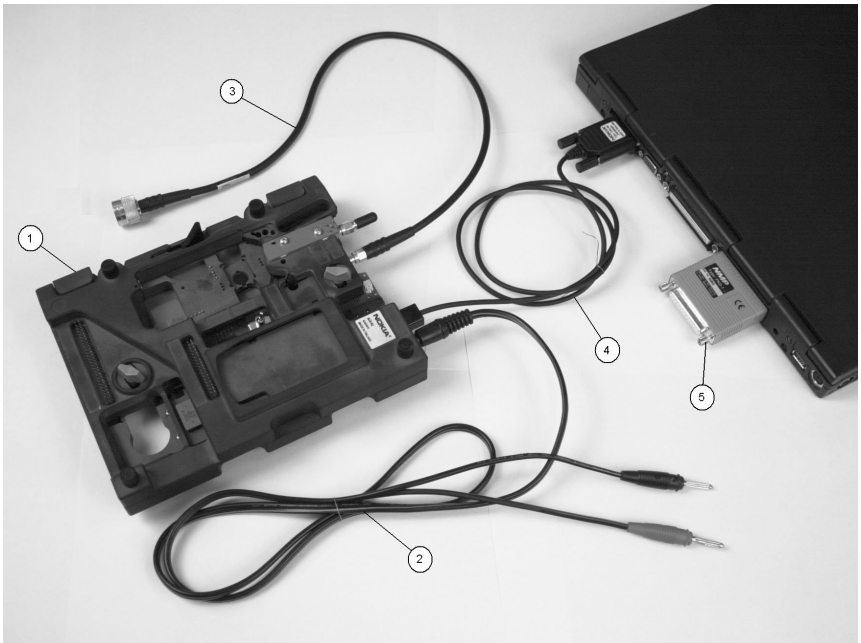
Avoid unnecessary tuning – factory tuning values are always the most accurate ones.

Views in this document may change as the service software is developed. Please refer to the Phoenix help files, phone model specific service manual and bulletins for help.

Service Tool Concept for RF Tunings

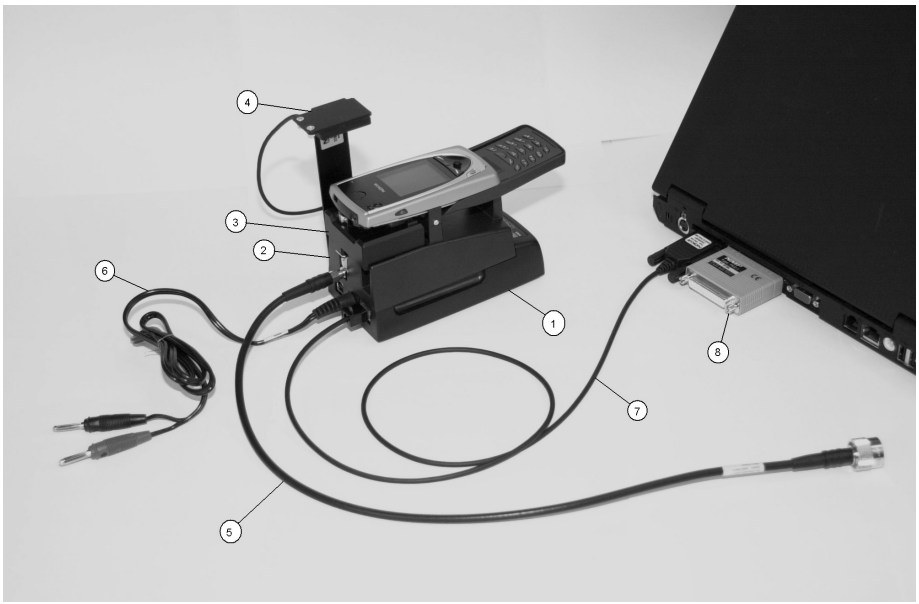
- All RF tunings should be carried out using in MJS-9Q (module jig), TDS-10 (RF-probe) or RA-7 (RF-adapter)
- CPL-5 coupler can only be used for testing, NOT for tuning!
- Power to MJS-9Q or to JBV-1 should be supplied from an external DC power supply, not FPS-8 prommer
- MJS-9Q maximum input voltage is +9 V DC, nominal input for RF tunings is +6V DC
- TDS-10 and RA7 needs MJF-7 (docking station adapter) in JBV-1 (docking station). JBV-1 input voltage is +14 V DC
- Remember cable and jig attenuations when setting required RF levels

Figure 8: Module jig MJS-9Q and other equipment for NHL-2NA RF tuning.



Item:	Service accessory		Product code
1	Module jig	MJS-9Q	0775284
2	DC power cable	PCS-1	0730012
3	RF antenna cable	XRF-1	0730085
4	Service MBUS cable	DAU-9S	0730108
5	Software protection key	PKD-1	0750018

Figure 9: RF-connection TDS-10 and other equipment for NHL-2NA RF tuning



Item:	Service accessory		Product code
1	JBV-1, Docking station		0770298
2	MJF-7, Docking station adapter		0775285
3	TDS-10 GSM RF Probe for RF tuning		0770436
4	TDS-11 Calibration lamp	Not needed in RF-tuning	0770440
5	XRF-1, RF antenna cable		0730085
6	PCS-1, DC power cable		0730012
7	DAU-9S, Service MBUS cable		0730108
8	PKD-1, Software protection key		0750018

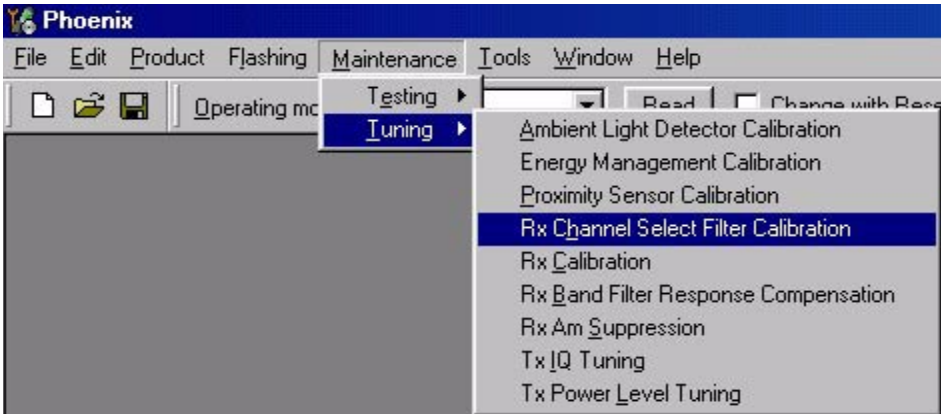
Note: RA7 can be used instead of TDS-10. RA7 replaces the antenna module, thus it's use requires opening 4 antenna screws in order to place RA7 to the phone.

Item:	Service accessory		Product code
-	RF adapter for NHL-2NA	RA7	0770443

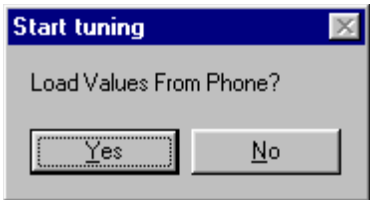
Receiver tunings

RX Channel Select Filter Calibration

- Extra equipment / external RF signal not needed
- Must be done before other RX calibrations
- This function is used to calibrate RX channel select filter in GSM Phones.
- Rx Channel select filter is tuned only in one band = Single calibration for both bands
- Select Maintenance => Tuning => Rx Channel select filter calibration



- Select “Yes” to start tuning with values already saved to the phone



- Press "AutoTune" to start the tuning

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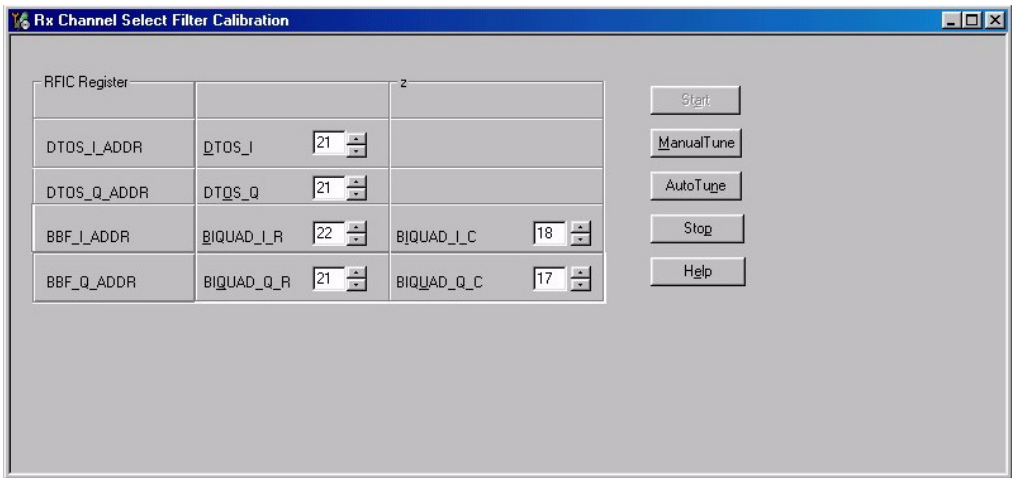
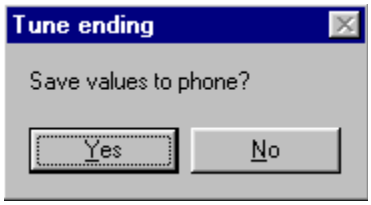


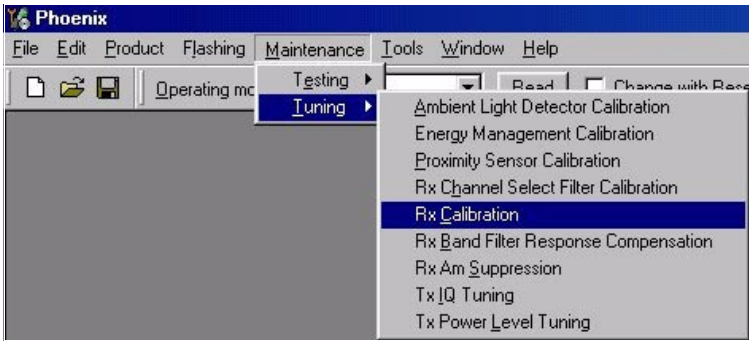
- Tuning values should be 0...31
- Select "Stop"
- If values shown are within limits, choose "Yes" to save values to the phone.



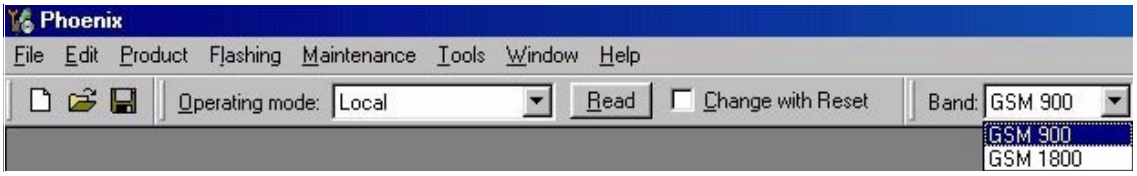
- Close the "RX Channel Select Filter Calibration "– dialog to end tuning

RX Calibration

- RF generator needed
- This tuning performs RX Calibration
- Must be done separately on both bands!
- Start RX Calibration at EGSM (GSM900), then do RX Calibration at GSM1800 band.
- AFC tuning is done while EGSM (GSM900) band RX Calibration is performed.
- *Remember to take jig and cable attenuations into account!*
- Select Maintenance => Tuning => Rx calibration



- When RX Calibration has been started, you can choose the correct band from the dropdown menu. Begin tuning from EGSM 900 band.



- Press "Start"

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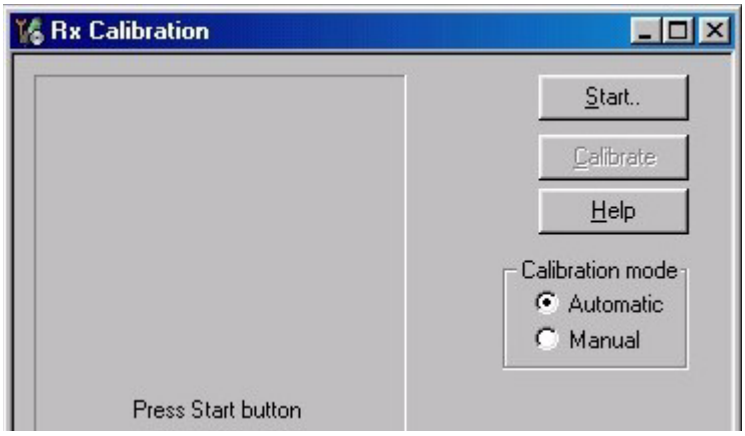
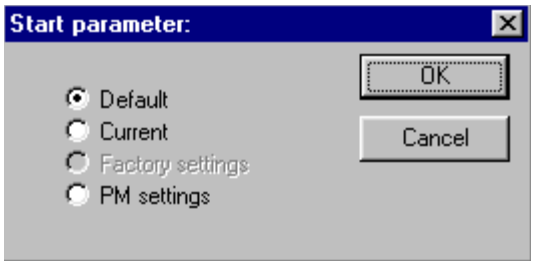
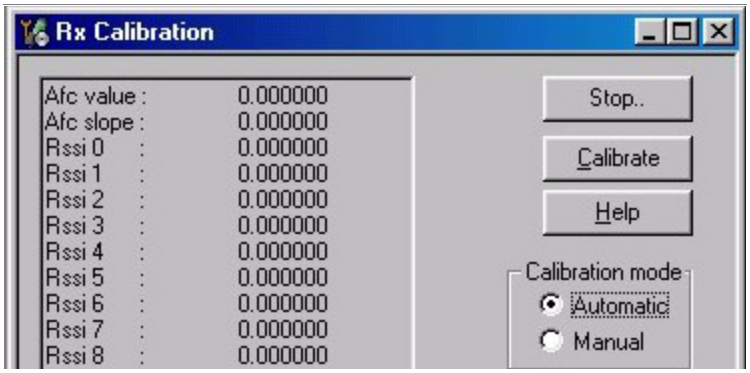


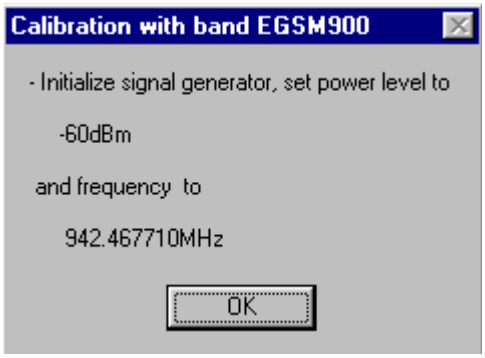
- Select "Default" to start tuning from factory default values => OK



- Set the Calibration mode to "Automatic"
- Press "Calibrate"



- Set RF generator to required frequency => OK

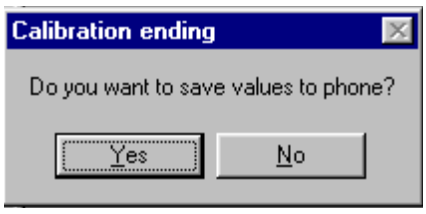


Tuning values and ADC readings will be shown

Typical values and limits in (GSM900) RX Calibration:

EGSM (GSM900)	**Typical value**	**Limits**
AFC value	-176	-350...+350
AFC slope	269	150...350
RSSI0	74	67...77
RSSI1	84	77...87
RSSI2	94	87...97
RSSI3	99.5	94...104
RSSI4	109.5	104...114
RSSI5	119.5	114...124
RSSI6	129.5	124...134
RSSI7	139.5	134...144
RSSI8	149.5	144...152

- Choose “Stop” to end tuning
- If values shown are within limits, choose “Yes” to save values to the phone



- Continue tuning from GSM1800. Choose the correct band from the dropdown menu.
- Press "Start" to continue just like in the EGSM900 Band above.

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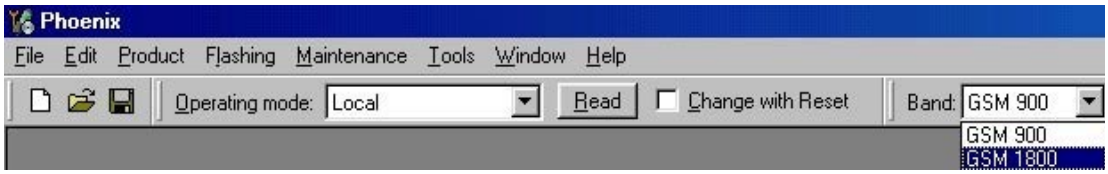
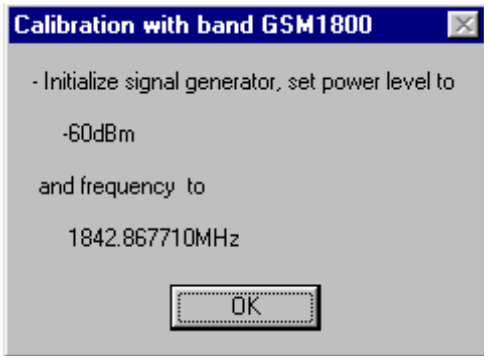


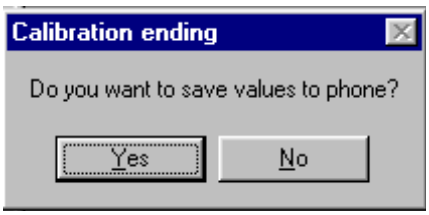
When asked, set RF generator to required frequency => OK



Typical values and limits in (GSM1800) RX Calibration:

GSM1800	Typical value	Limits
RSSI0	66.5	63...73
RSSI1	76.5	73...83
RSSI2	86.5	83...93
RSSI3	99.5	94...104
RSSI4	109.5	104...114
RSSI5	119.5	114...124
RSSI6	129.5	124...134
RSSI7	139.5	134...144
RSSI8	149.5	144...152.5

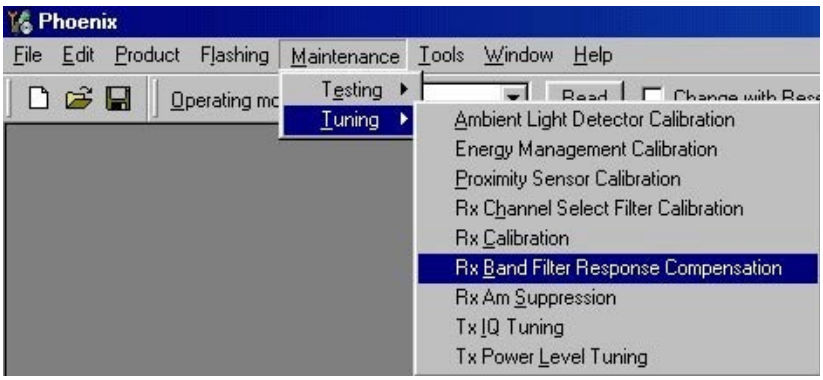
- Choose "Stop" to end tuning
- If values shown are within limits, choose "Yes" to save values to the phone



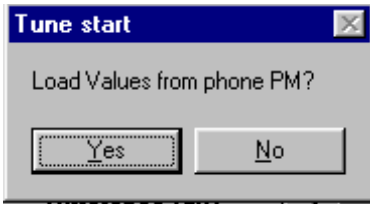
- Close the "RX – Calibration – dialog to end tuning

RX Band Filter Response Compensation

- RF generator needed
- Must be done separately on both bands!
- Start RX Band Filter Response Compensation at EGSM (GSM900), then do RX Band Filter Response Compensation at GSM1800 band.
- *Note: Remember to do RX calibration before doing Rx Band Filter Response Compensation!*
- Remember to take jig and cable attenuations into account!
- Select Maintenance => Tuning => Rx band filter response compensation



- Select "Yes" to start tuning with values already saved to the phone



- Select "Manual tuning"

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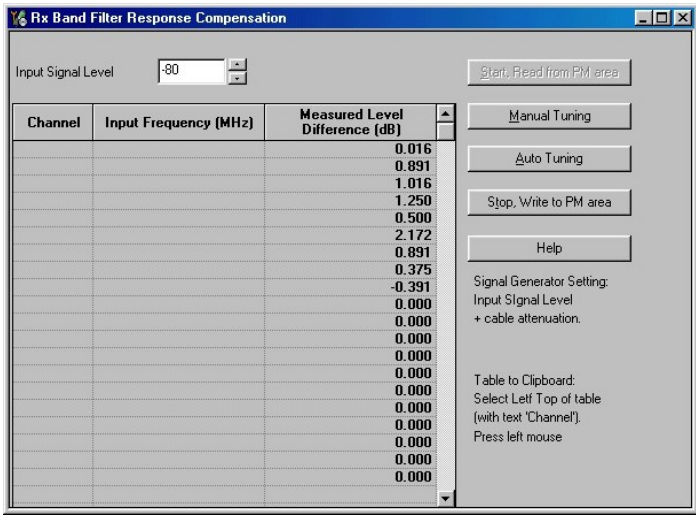
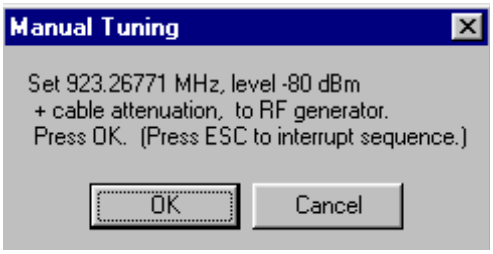
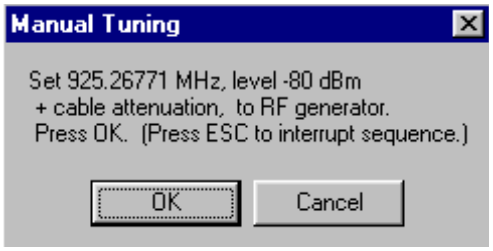


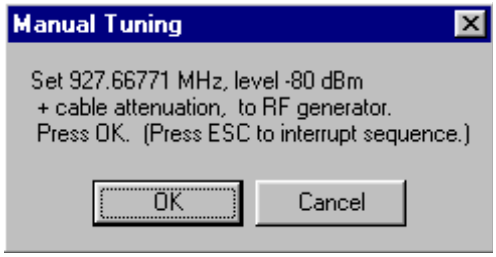
- You will be asked to supply 9 different RF frequencies to the phone
- Set first required frequency and level => OK



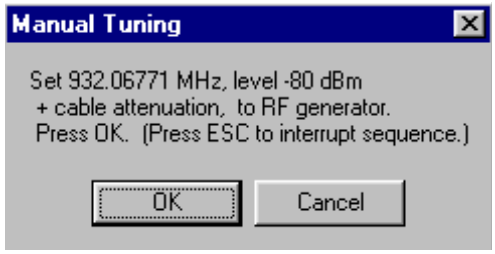
- Set 2nd required frequency and level => OK



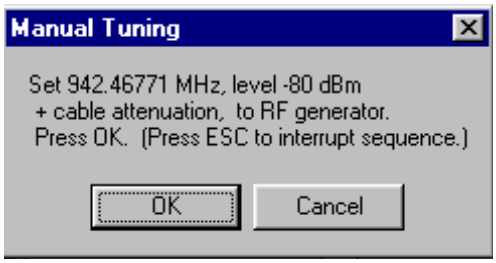
- Set 3rd required frequency and level => OK



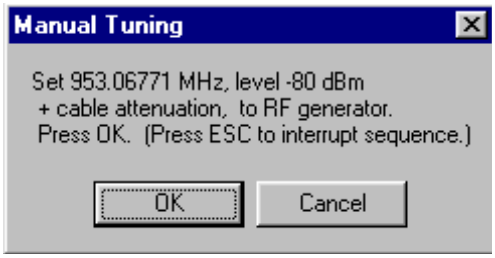
- Set 4th required frequency and level => OK



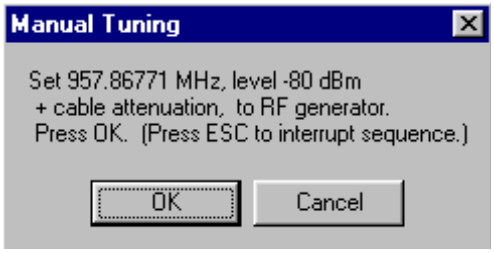
- Set 5th required frequency and level => OK



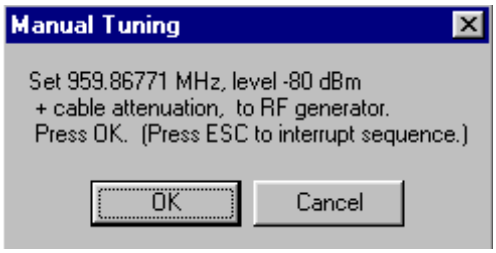
- Set 6th required frequency and level => OK



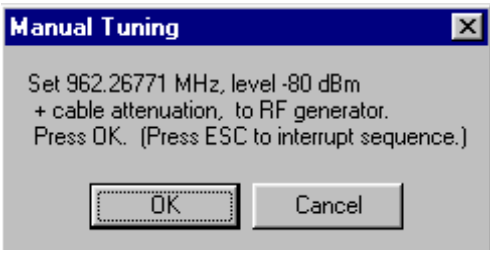
Set 7th required frequency and level => OK



Set 8th required frequency and level => OK



Set 9th required frequency and level => OK

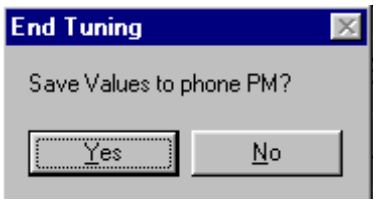


Typical values and limits in Rx Band Filter Response Compensation EGSM900:

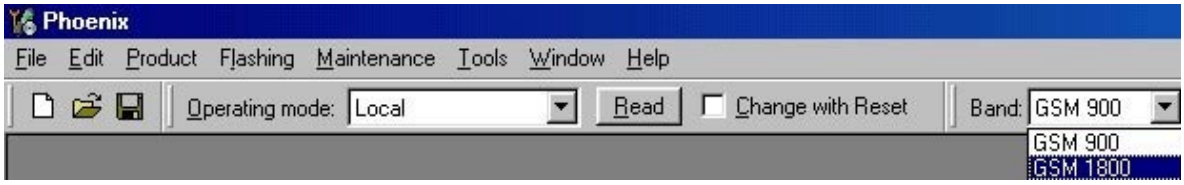
Channel	Input frequency (MHz)	Measured level difference (dB)	Limits (dB)
965	923.26771	-0.118	-10...+5
975	925.26771	0.511	-5...+5
987	927.66771	0.857	-5...+5
1009	932.06771	1.174	-5...+5
37	942.46771	0.569	-5...+5
90	953.06771	1.928	-5...+5
114	957.86771	0.964	5...+5
124	959.86771	0.545	-5...+5
136	962.26771	-0.040	-10...+5

- Choose "Stop, write to PM area"

- If values shown are within limits, choose "Yes" to save values to the phone



Continue tuning from GSM1800. Choose the correct band from the dropdown menu.



- Repeat the same steps as for the EGSM900 band above

Typical values and limits in Rx Band Filter Response Compensation GSM1800:

Channel	Input frequency (MHz)	Measured level difference (dB)	Limits (dB)
497	1802.26771	0.214	-10...+5
512	1805.26771	1.739	-5...+5
535	1809.86771	2.056	-5...+5
606	1824.06771	1.632	-5...+5
700	1842.86771	0.583	-5...+5
791	1861.06771	0.734	-5...+5
870	1876.86771	0.616	-5...+5
885	1879.86771	0.185	-5...+5
908	1884.46771	-1.132	-10...+5

- If values shown are within limits, save values to the phone
- Close the "RX Band Filter Response Compensation" – dialog to end tuning

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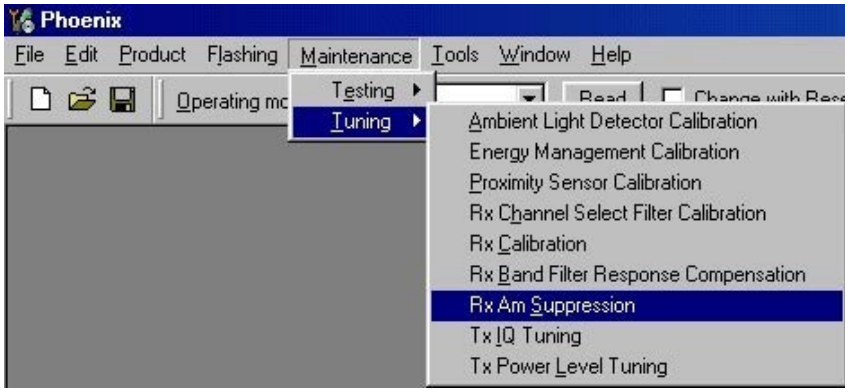
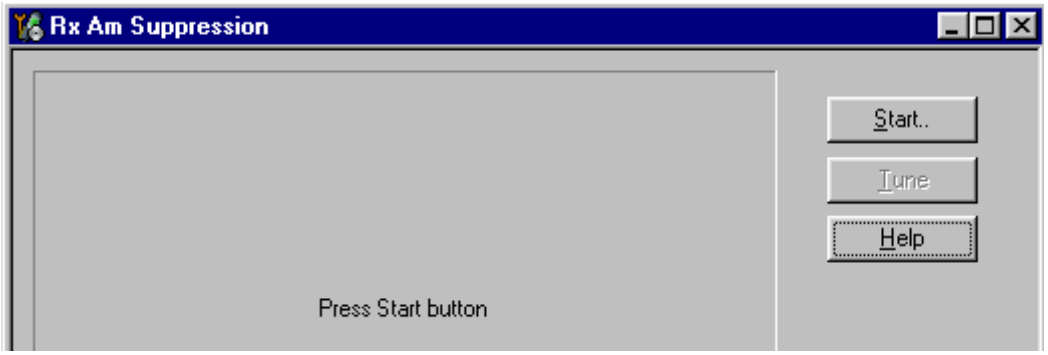
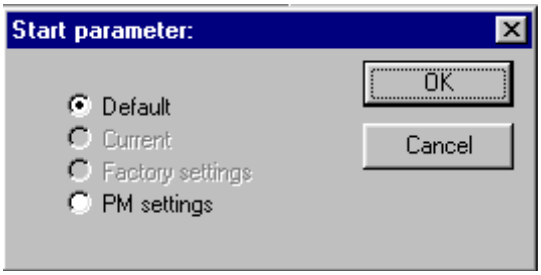
RX AM Suppression

- RF generator needed (AM modulation)
- Must be done separately on both bands!
- Start RX AM Suppression at EGSM (GSM900), then do RX AM Suppression at GSM1800 band.
- This dialog performs RX AM Suppression.
- Remember to take jig and cable attenuations into account!
- Select Maintenance => Tuning => Rx Am suppression

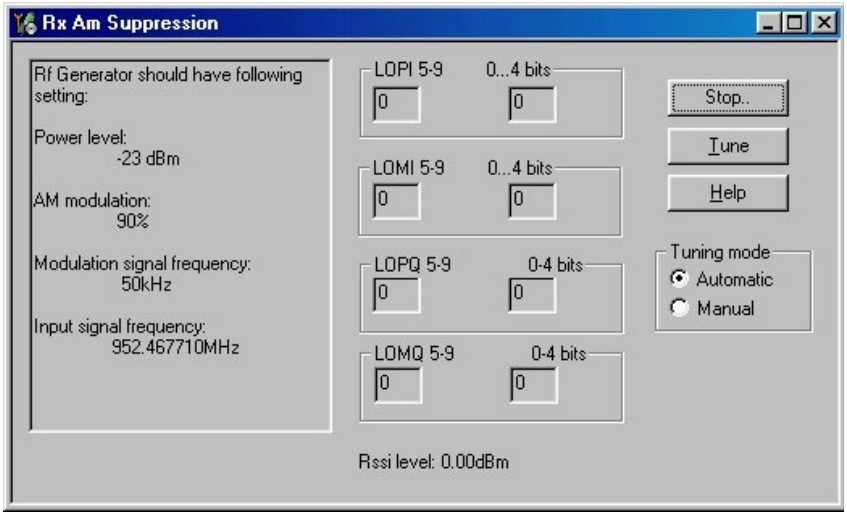


- Start => Default settings => OK,





- Set RF generator to state described in the window below.
- Set the Tuning mode to “Automatic”
- Press the “Tune” button to perform actual tuning.
- The new tuning values and Rssi dBm value are updated.



- One "I" and "Q" line values should be 0, other values 0..31
- RSSI level should be around -107 dBm

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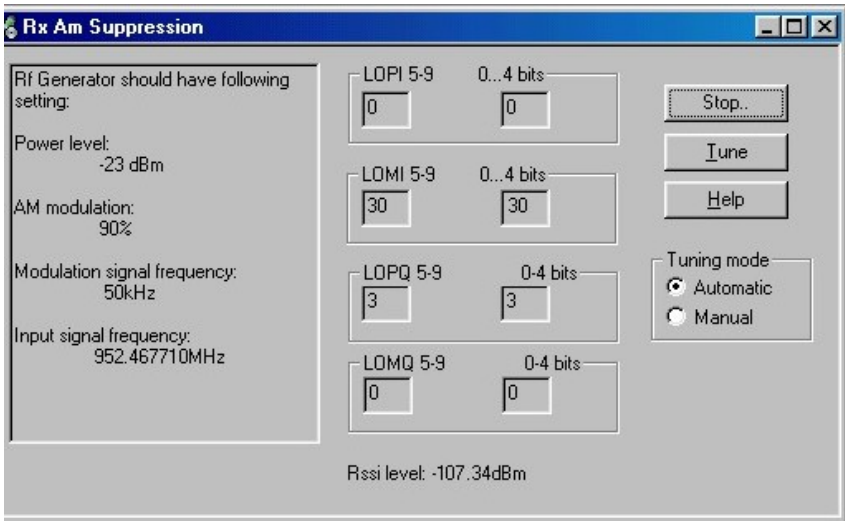
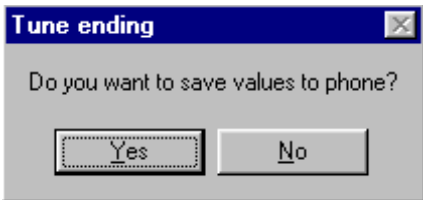
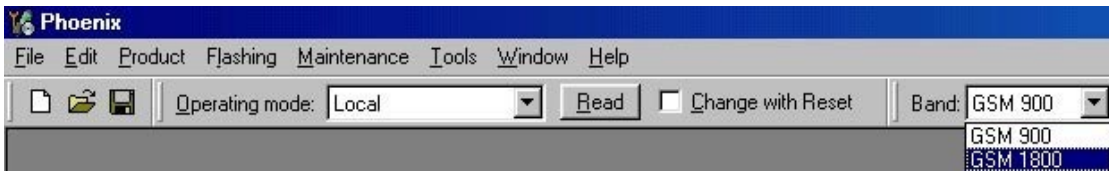


- If values shown are within limits, Select "Stop"
- Choose "Yes" to save values to the phone



- **Continue tuning from GSM1800.** Choose the correct band from the dropdown menu.

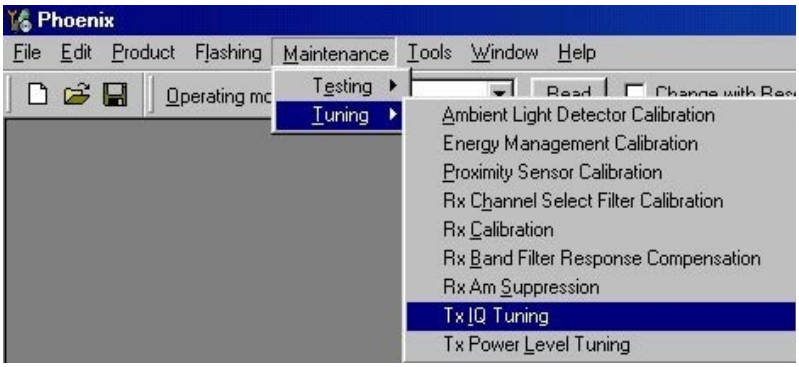


- Repeat the same steps as for the EGSM900 band
- If values shown are within limits, choose "Yes" to save values to the phone
- Close the "RX AM Suppression" – dialog to end tuning

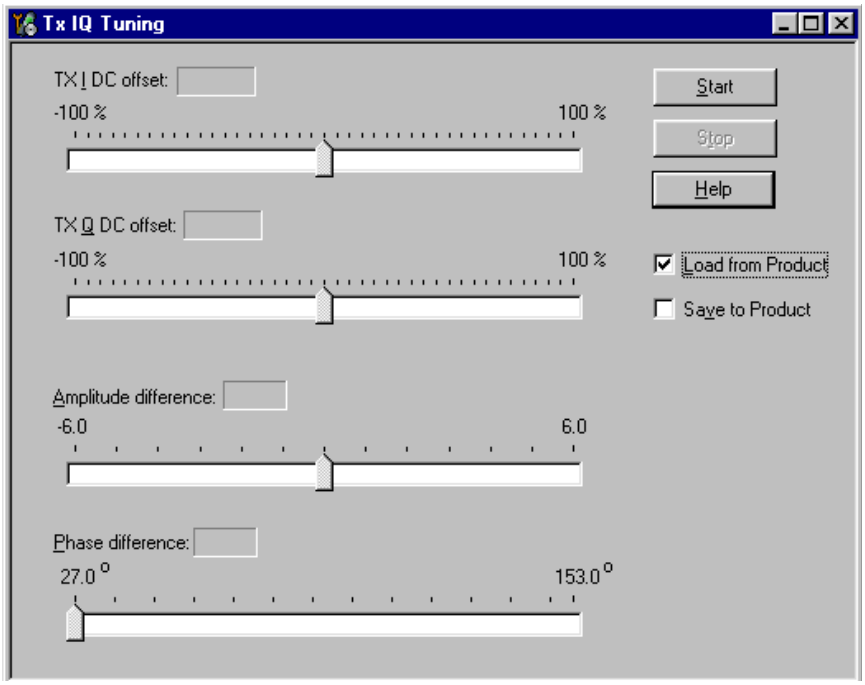
Transmitter Tunings

TX I/Q Tuning

- Spectrum analyzer needed
- Tx IQ Tuning allows changing the Tx I DC Offset, Tx Q DC Offset, Amplitude difference and Phase difference
- Must be done separately on both bands!
- Start TX I/Q Tuning at EGSM (GSM900), then continue at GSM1800 band.
- Remember to take jig and cable attenuations into account!
- Select Maintenance => Tuning => Tx_IQTuning



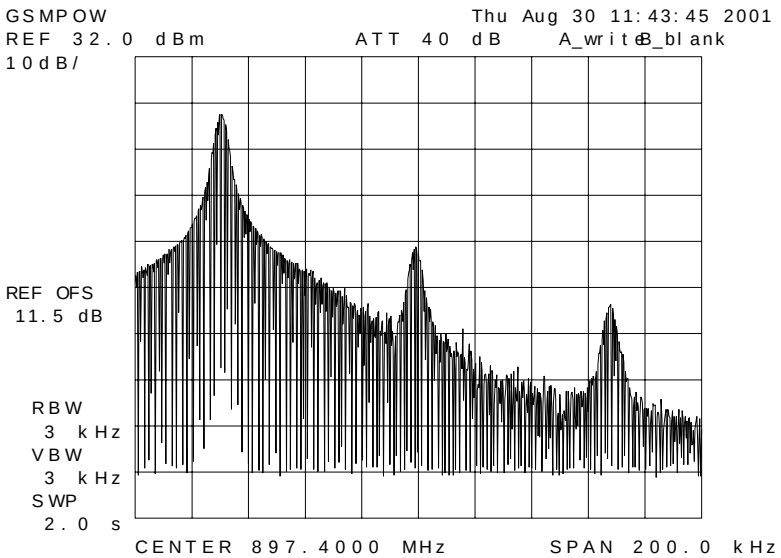
- Select "Load from product" => Start
- The tuning is done by setting each of the sliders to desired value. The sliders can be changed only when the tuning is ongoing.
- The order of tuning should be same as the order of the sliders e.g. the Tx I DC Offset is tuned first and Phase difference is tuned last.
- Use <=, =>, PgUp or PgDn keys



- Set spectrum analyzer center frequency to 897.4 MHz, span 200kHZ, RBW and VWB 3kHz and sweeptime to 2 seconds

- Tune LO leak to minimum with TXI/TXQ DC offset control (**f0 on spectrum analyzer screen**)

- Tune wrong sideband to minimum using Amplitude/Phase difference controls (**f0+68kHz on spectrum analyzer screen**)



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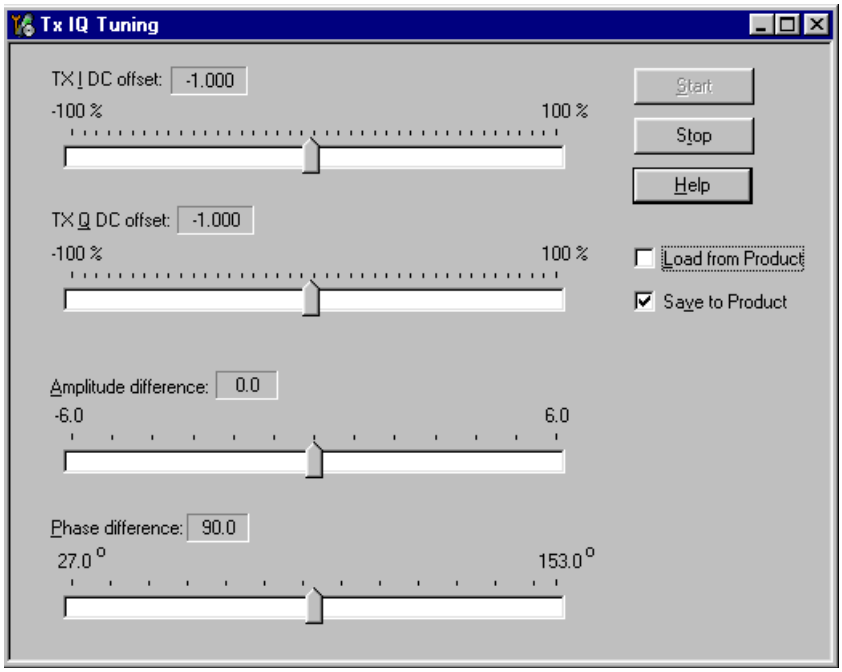
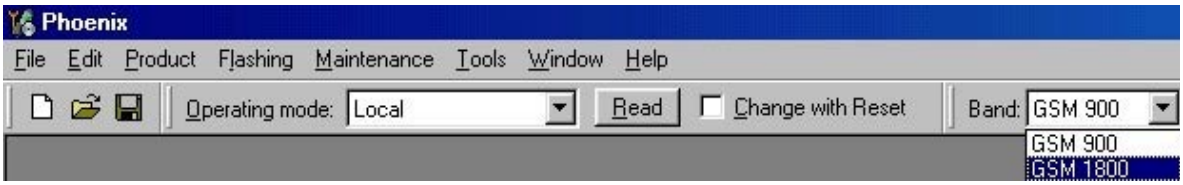
Typical TX Iq Tuning Values and tuning limits GSM 900:

I DC Offset	-2.5...+0.5	-6...+6
Q DC Offset	-2.5...+0.5	-6...+6
Amplitude difference	-0.2...+0.2	-1...+1
Phase difference	88.0°....92.0°	80°...100°

- If values shown are within limits, check the "Save to product" tick box and choose “Stop” save the new values to the product



- **Continue tuning from GSM1800.** Choose the correct band from the dropdown menu.



- Repeat the same steps as for the EGSM900 band

- Set spectrum analyzer center frequency to 1747.8 MHz, span 200kHZ, RBW and VWB 3kHz and sweeptime to 2 seconds

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Typical TX IQ Tuning Values and tuning limits GSM1800:

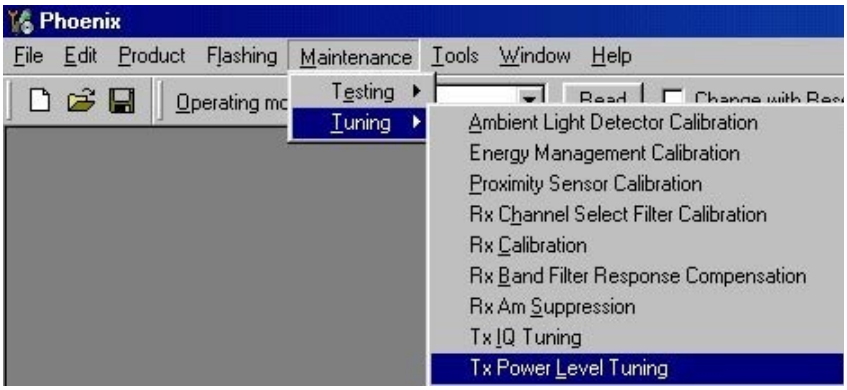
I DC Offset	-3.0...0.0	-6...+6
Q DC Offset	-1.5...+1.0	-6...+6
Amplitude difference	-0.5...+0.0	-1...+1
Phase difference	90.0°...97.0°	80°...100°

- If values shown are within limits, check the "Save to product" tick box and choose "Stop" save the new values to the product

- Close the "TX I/Q Tuning" – dialog to end tuning

TX Power Level Tuning

- Power Meter with peak power sensor (or Spectrum analyzer) needed
- With Tx Power Level Tuning, the coefficients are adjusted for each power level
- Must be done separately on both bands!
- Start Power Level tuning at EGSM (GSM900), then continue at GSM1800 band.
- In EGSM900 band The power level tuning is made for both high and low PA Modes
- In GSM1800 band only for high PA mode.
- Maintenance => Tuning => Tx power level tuning
- Remember to take jig and cable attenuations into account!



- Select "Start" => "Load from: Permanent memory" => "OK "
- *Note that TX PA mode is "High" at this point.*

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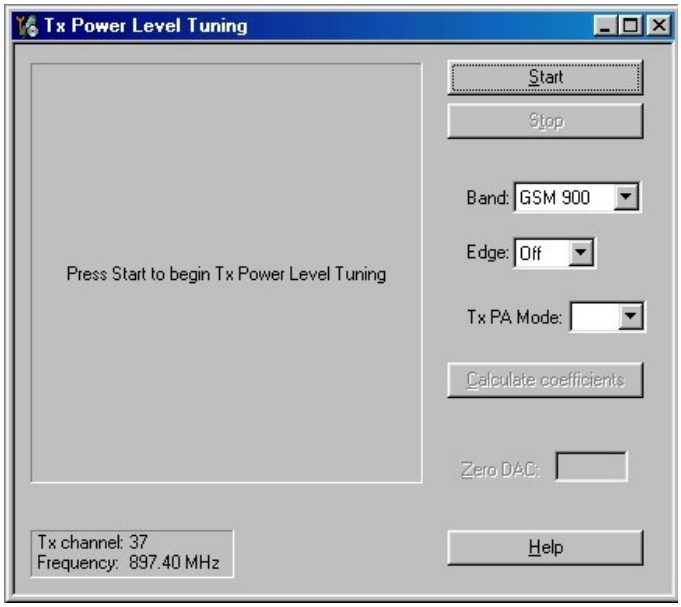
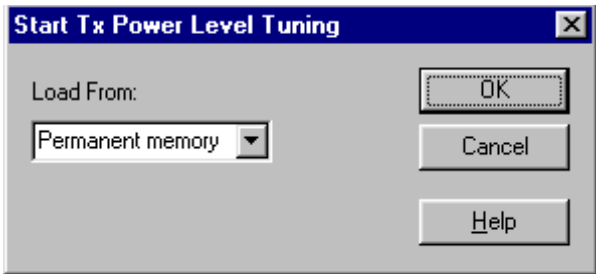
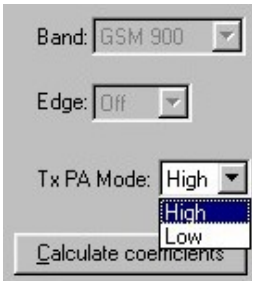




- The coefficient table lists the power level, coefficient, target dBm and DAC value for each power level.
- The tuned power level can be chosen by using up and down arrows or mouse.
- The current power level is shown with inverse colors.
- The tuning value can be adjusted with "-" and "+" keys
- **Tune base level and power levels 19,15 and 5** to target level
- Press "Calculate coefficients"
- **Change TxPA Mode to "Low"** from the drop down menu. When the PA Mode is changed, the previous values are saved in memory and the ones for new mode are shown

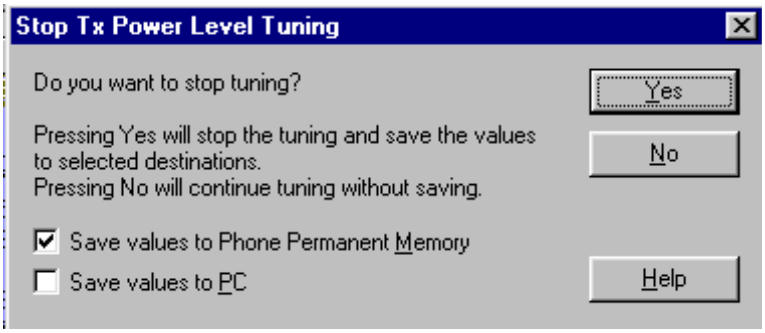


- **Tune power levels 19, 15 and 7** (Levels 5 & 6 are not used, base level tuning not needed)
- Press "Calculate coefficients"

Typical values: EGSM900

Power level	PA high mode	PA low mode
5	0.700...0.750	-
7	-	0.530...0.570
15	0.190...0.210	0.190...0.210
19	0.170...0.180	0.170...0.180
Base	0.140...0.150	0.140...0.150

- If values shown are within limits select "Stop" and check "Save values to phone permanent memory"
- Select "Yes" to save values to phone


Stop Tx Power Level Tuning
Do you want to stop tuning?
Yes
Pressing Yes will stop the tuning and save the values to selected destinations.
Pressing No will continue tuning without saving.
No
Save values to Phone Permanent Memory
Save values to PC
Help

- **Continue tuning from GSM1800.** Choose the correct band from the dropdown menu.

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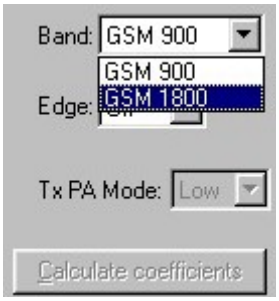
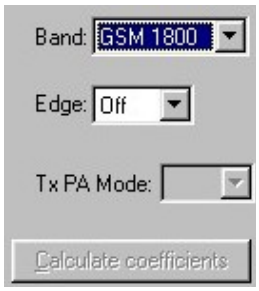


- Repeat the same steps as for the EGSM900 band above
- Note that In GSM1800 band PA mode can not be changed because tuning is only made in "High" mode



Typical values: GSM1800

Power level	**PA high mode**
0	0.620...0.670
11	0.170...0.190
15	0.150...0.170
Base	0.140...0.150

- If values shown are within limits select "Stop" and check "Save values to phone permanent memory"
- Select "Yes" to save values to phone
- Close the "TX Power Level Tuning" – dialog to end tuning

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Service Concepts

New Service Accessories for NHL-2NA

PART NO	PG	PART NAME
0775285	67	MJF-7 Docking station adapter (Does not include CPL-5 RF coupler)
0770370	59	CPL-5 RF coupler
0770443	60	RA7 RF Adapter for NHL-2NA (Screw connection)
0770436	640 EUR	TDS-10 GSM RF probe for RF tuning
0775284	620 EUR	MJS-9Q module Jig
0775283	60	FLA-21 POS adapter (Single unit, no cables included)
0770286	48	SRT-4 Opening tool (upper part)
0770444	48	SRT-5 Opening tool (lower part)
0770439	60	MJS-79 Soldering jig. Holds phone PWB in automatic soldering machines
0770440	79	TDS-11, Calibration lamp. Ambient light sensor calibration lamp.
N.A	N.A.	Flex soldering head made by Metcal. Order info in Service manual

Spare parts for service accessories

PART NO	PG	PART NAME
0770335	58	JBS-28, Uniform light source module (Used in camera tests, one piece included in MJF-7. Spare module can be ordered with this code)
0770437	31	Ground pin, TDS-10 Accessory
0770438	52	Insulated antenna pin, TDS-10 accessory
0770497	N.A.	SRT-8 pin insertion tool for TDS-10 (Price will be announced later)

MJS-9Q, MJF-7 and FLA-21 Spare pin codes will be announced later with a technical bulletin.

Service tools used with other NMP products, but needed also for NHL-2NA

PART NO	PG	PART NAME
0730108	49	MBUS Cable DAU-9S to connect PC to service tools
0730218	46	XCS-1, SERVICE CABLE (POS flash cable)
0730178	42	Service Cable XCS-4 (to interconnect FPS-8 and JBV-1/ FLA-21). Mod 10 to mod 10 shielded cable with one separately shielded conductor (MBUS/SCK).
0730012	43	Power Supply Cable PCS-1 for JBV-1 and MJS-9Q
0730114	31	Service Battery Cable SCB-3. Needed for EM-calibrations
0080321	800 EUR	FPS-8, Flash Prommer sales pack, incl. Parallel cable, AXS-4, AXP-8 and ACF-8 power supply
0080396	8000 EUR	FPS-8C Parallel Flash Prommer
0080346	72	SF12 SRAM Module (2 pcs needed inside FPS-8, Code includes one piece)
0750018	56	PKD-1 Software protection key
0770431	48	SRT-6 Opening tool
0730085	46	XRF-1, RF antenna cable
0081490	64	JBT-9, Bluetooth test box including SMA stub antenna
N.A.	ACP-8,	Power supply for JBT-9
0730185	42	FLC-2, Power Supply Cable to interconnect FPS-8 and FLA-21
0770298	70	JBV-1, Docking Station
0080541	71	FLS-4S, POS Flash dongle, for E/A area
0080542	71	FLS-4S, POS Flash dongle, for APAC area
0080465	65	LRK-1, LGA rework kit, sales package incl. 0770349 MJS-54, LGA RE-WORK JIG, 0770348 SES-1, STENCIL LGA RE-WORK JIG and 0770381 SPS-1,

		SOLDERING PASTE SPREADER
0770380	49	SPI-1, SOLDERING PASTE INJECTOR, NOTE shelf life only 1 month

Prices and price groups are subject to change without notice.

Service accessory warranty

Service Accessories have 24 months (JBV-1, MJF-7, CPL-5, FLA-21, SRT-4, SRT-5, TDS-10, TDS-11, RA7 and FPS-8 made by PKC Group or Flextronics) and 30 months (MJS-9Q, MJS-79 and LRK-1 made by Sorv-Elektro Oy) warranty period and the Vendors' duty is to repair Accessories also after the warranty.

It is also agreed that Vendors will deliver needed components to you in case you want to repair ServAccs by yourself after the warranty.)

Setup Instructions

NHL-2NA SW Update Using FPS-8 and FLA-21

Figure 1: NHL-2NA SW update using FPS-8. Opening tools SRT-4 and SRT-5 are not in the picture.

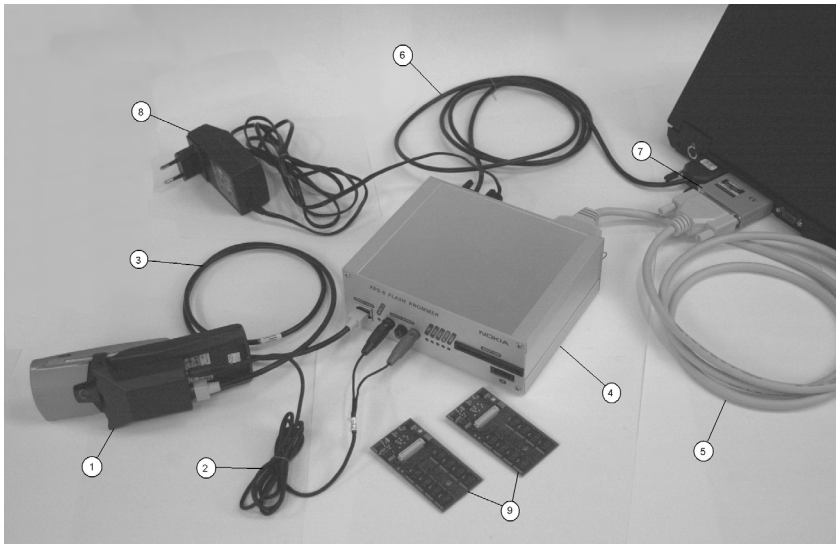

Table 1: Connecting NHL-2NA to PC with FPS-8, list of equipment which is needed

Item:	Service accessory		Product code
1	Point of Sales flash loading adapter	FLA-21	0775283
2	Power cable	FLC-2	0730185
3	Modular cable	XCS-4	0730178
4	Flash prommer box sales pack	FPS-8	0080321
5	Printer cable, incl in FPS-8 sales pack	AXP-8	Not available
6	D9 – D9 cable, incl in FPS-8 sales pack	AXS-4	0730090
7	Software protection key	PKD-1	0750018
8	Power supply, incl in FPS-8 sales pack	ACF-8	0680032
9	SRAM Module (2 pcs needed inside FPS-8)	SF12	0080346 (Code includes one SRAM module)
Not in picture	Service SW		N.A.
Not in picture	Opening tool (upper part)	SRT-4	0770286
Not in picture	Opening tool (Lower part)	SRT-5	0770444

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NHL-2NA SW Update in Point of Sales

Figure 2: NHL-2NA SW update using FLS-4S. STR-4 and SRT-5 not in picture.

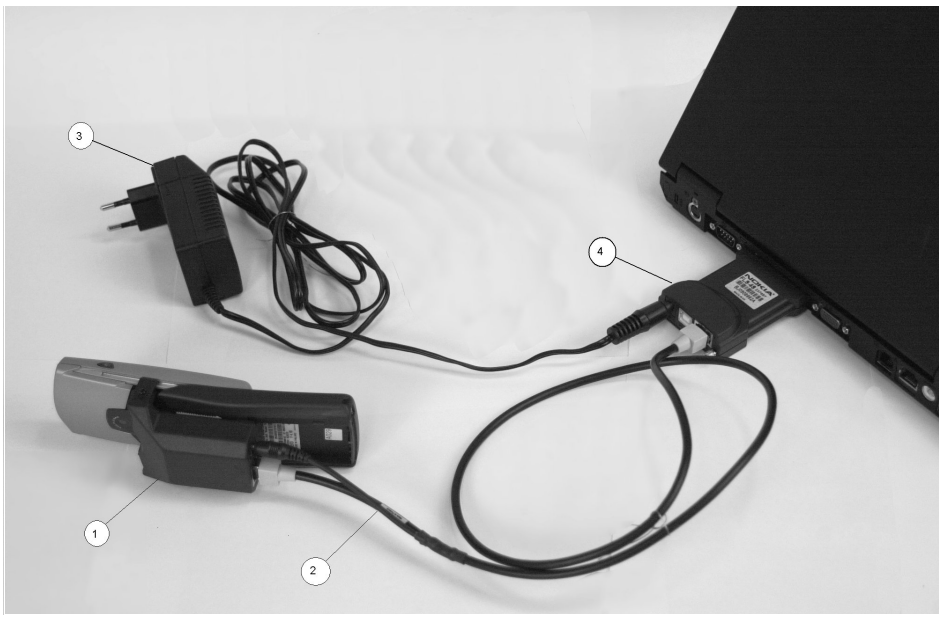

Table 2: NHL-2NA POS flash equipment list:

Item:	Service accessory		Product code
1	Point of Sales flash loading adapter	FLA-21	0775283
2	Service cable	XCS-1	0730218
3	Power supply	ACF-8	0680032
4	POS flash dongle, for E/A area	FLS-4S	0080541
	POS flash dongle, for APAC area	FLS-4S	0080542
Not in picture	Service SW		N.A.
Not in picture	Opening tool (upper part)	SRT-4	0770286
Not in picture	Opening tool (Lower part)	SRT-5	0770444

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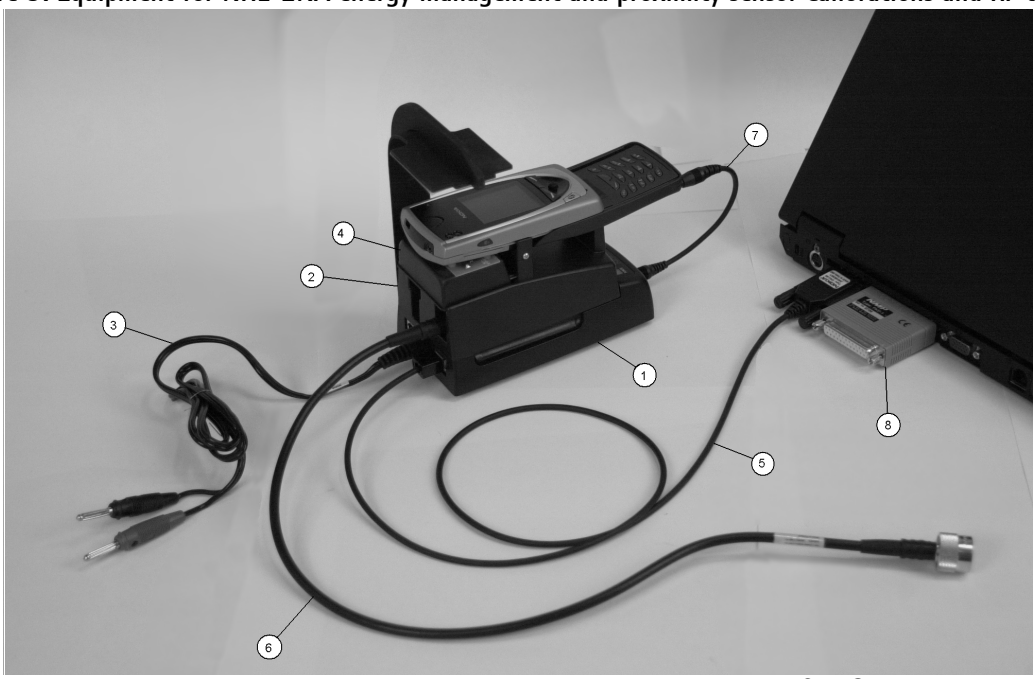
Energy Management and Proximity sensor Calibrations and RF Testing (Assembled phone)

Figure 3: Equipment for NHL-2NA energy management and proximity sensor calibrations and RF testing.

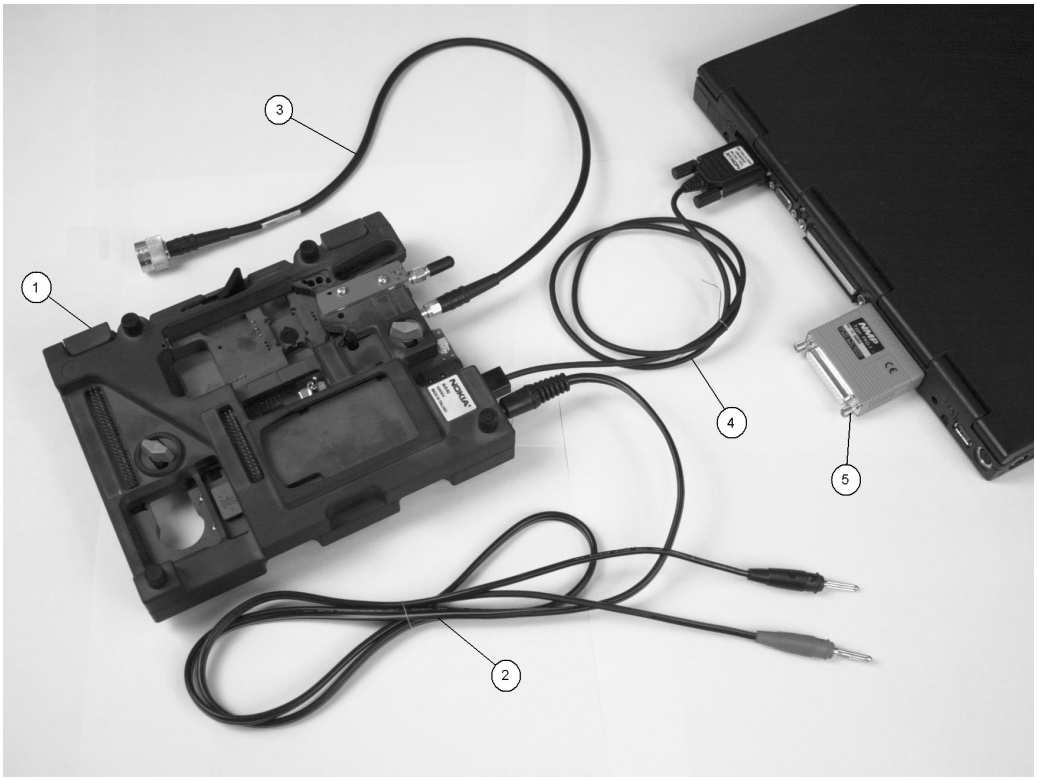


MJF-7 includes also white light source which can be used for Camera image quality checking. Note, RF tuning is not allowed with CPL-5 coupler, it can be used only to test RF.

Item:	Service accessory		Product code
1	Docking station	JBV-1	0770298
2	Docking station adapter	MJF-7	0775285
3	DC power cable	PCS-1	0730012
4	RF Coupler	CPL-5	0770370
5	Service Cable	DAU-9S	0730108
6	RF Cable	XRF-1	0730085
7	DC Cable	SCB-3	0730114
8	Software protection key	PKD-1	0750018
Not in picture	Service SW		N.A.
Not in picture	Opening tool (upper part)	SRT-4	0770286
Not in picture	Opening tool (Lower part)	SRT-5	0770444

Component level fault finding equipment:

Figure 4: MJS-9Q module jig is used for component level fault finding. RF tuning and SW update of disassembled phone is also possible.



Item:	Service accessory		Product code
1	Module jig	MJS-9Q	0775284
2	DC power cable	PCS-1	0730012
3	RF antenna cable	XRF-1	0730085
4	Service MBUS cable	DAU-9S	0730108
5	Software protection key	PKD-1	0750018
Not in picture	Service SW		N.A.
Not in picture	Opening tool (upper part)	SRT-4	0770286
Not in picture	Opening tool (Lower part)	SRT-5	0770444
Not in picture	Opening tool 'button type'	SRT-6	0770431

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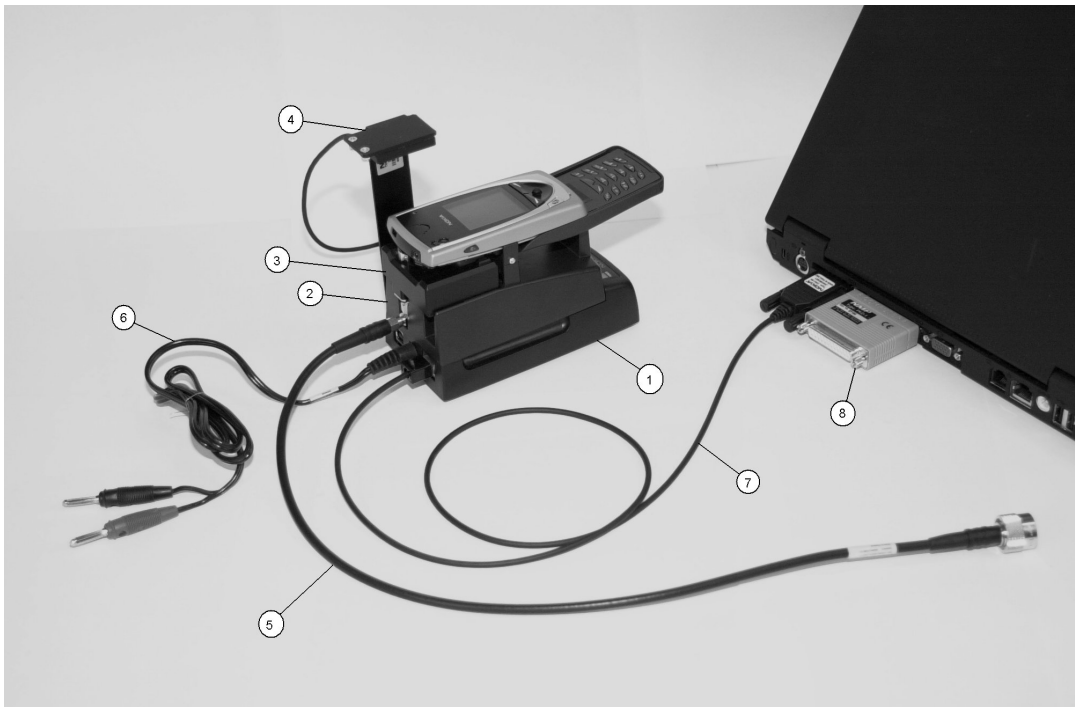
Assembled Phone RF Tuning and Ambient Light Sensor Calibration Equipment

Figure 5: Equipment for NHL-2NA RF tuning and ambient light sensor calibration.

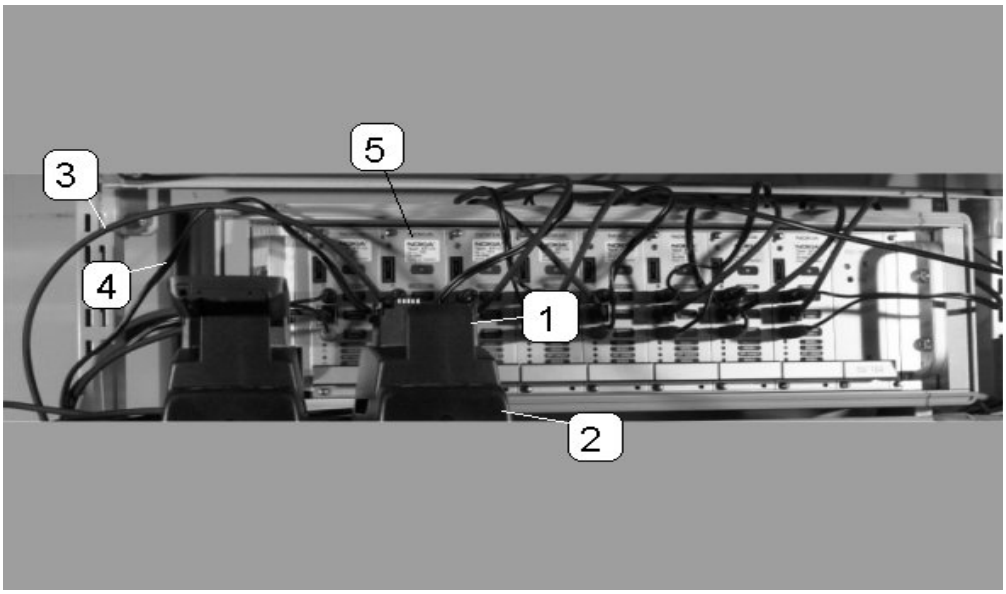


Item:	Service accessory		Product code
1	JBV-1, Docking station		0770298
2	MJF-7, Docking station adapter		0775285
3	TDS-10 GSM RF Probe for RF tuning		0770436
4	TDS-11 Calibration lamp		0770440
5	XRF-1, RF antenna cable		0730085
6	PCS-1, DC power cable		0730012
7	DAU-9S, Service MBUS cable		0730108
8	PKD-1, Software protection key		0750018
-	RF adapter for NHL-2NA	RA7	0770443
Not in picture	Service SW		N.A.
Not in picture	Opening tool (upper part)	SRT-4	0770286
Not in picture	Opening tool (Lower part)	SRT-5	0770444

Note: RA7 can be used instead of TDS-10. RA7 is less expensive but its use requires opening four transceiver screws every time you use it.

SW update using FPS-8C, JBV-1 and MJF-7

Figure 6: NHL-2NANHL-2NA SW update using FPS-8C, JBV-1 and MJF-7



Item:	Service accessory		Product code
1	Docking station adapter (8 pcs needed)	MJF-7	0775285 (Code includes one piece)
2	Docking station (8 pcs needed)	JBV-1	0770298 (Code includes one piece)
3	Modular cable (8 pcs needed)	XCS-4	0730178 (Code includes one piece)
4	DC power cable (8 pcs needed)	PCS-1	0730012 (Code includes one piece)
5	FPS-8C (one piece needed)	FPS-8C	0080396
Not in picture	SRAM Module (16 pcs needed inside FPS-8C)	SF12	0080346 (Code includes one SRAM module)
Not in picture	D9 – D9 cable, incl in FPS-8C sales pack (1 Pc needed)	AXS-4	0730090
Not in picture	Printer cable, incl in FPS-8C sales pack (1 Pc needed)	AXP-8	N.A.
Not in picture	Software protection key	PKD-1	0750018
Not in picture	SW, Software (PC SW + SF11C SW)	-	N.A.

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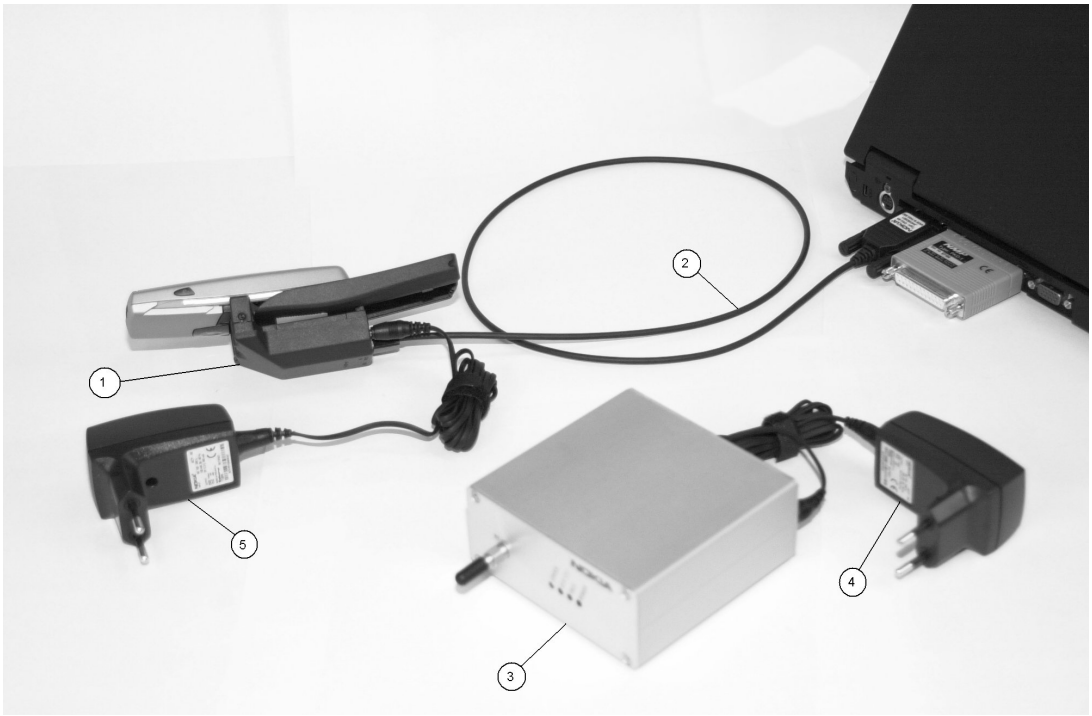
NHL-2NA Bluetooth Testing

Figure 7: Equipment needed to perform NHL-2NA BT BER test.



Item:	Service accessory		Product code
1	Point of Sales flash loading adapter	FLA-21	0775283
2	Service MBUS cable	DAU-9S	0730108
3	Test- & IF-Box Bluetooth	JBT-9	0770336
4,5	Power supply for JBT-9 and for FLA-21	ACP-8*	N.A.

Alternatively, MJF-7 + JBV-1 combination can be used instead of FLA-21.

Appendix

Frequency mappings

The following figure shows the RX/TX operating frequency mapping to the frequency synthesizer operating frequency. For a more detailed list of actual channel number mappings see below.

Figure 8: VCO frequency mappings

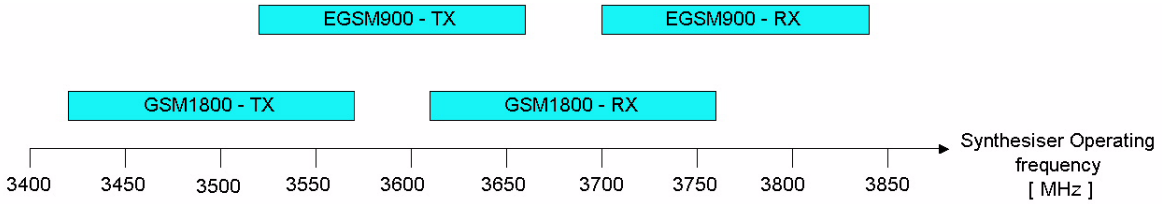


Table 1 - E-GSM900 Channel to VCO operating frequency mapping

Ch	TX	RX	VCO TX	VCO RX	Ch	TX	RX	VCO TX	VCO RX	Ch	TX	RX	VCO TX	VCO RX
975	880.2	925.2	3520.8	3700.8	1	890.2	935.2	3560.8	3740.8	63	902.6	947.6	3610.4	3790.4
976	880.4	925.4	3521.6	3701.6	2	890.4	935.4	3561.6	3741.6	64	902.8	947.8	3611.2	3791.2
977	880.6	925.6	3522.4	3702.4	3	890.6	935.6	3562.4	3742.4	65	903	948	3612	3792
978	880.8	925.8	3523.2	3703.2	4	890.8	935.8	3563.2	3743.2	66	903.2	948.2	3612.8	3792.8
979	881	926	3524	3704	5	891	936	3564	3744	67	903.4	948.4	3613.6	3793.6
980	881.2	926.2	3524.8	3704.8	6	891.2	936.2	3564.8	3744.8	68	903.6	948.6	3614.4	3794.4
981	881.4	926.4	3525.6	3705.6	7	891.4	936.4	3565.6	3745.6	69	903.8	948.8	3615.2	3795.2
982	881.6	926.6	3526.4	3706.4	8	891.6	936.6	3566.4	3746.4	70	904	949	3616	3796
983	881.8	926.8	3527.2	3707.2	9	891.8	936.8	3567.2	3747.2	71	904.2	949.2	3616.8	3796.8
984	882	927	3528	3708	10	892	937	3568	3748	72	904.4	949.4	3617.6	3797.6
985	882.2	927.2	3528.8	3708.8	11	892.2	937.2	3568.8	3748.8	73	904.6	949.6	3618.4	3798.4
986	882.4	927.4	3529.6	3709.6	12	892.4	937.4	3569.6	3749.6	74	904.8	949.8	3619.2	3799.2
987	882.6	927.6	3530.4	3710.4	13	892.6	937.6	3570.4	3750.4	75	905	950	3620	3800
988	882.8	927.8	3531.2	3711.2	14	892.8	937.8	3571.2	3751.2	76	905.2	950.2	3620.8	3800.8
989	883	928	3532	3712	15	893	938	3572	3752	77	905.4	950.4	3621.6	3801.6
990	883.2	928.2	3532.8	3712.8	16	893.2	938.2	3572.8	3752.8	78	905.6	950.6	3622.4	3802.4
991	883.4	928.4	3533.6	3713.6	17	893.4	938.4	3573.6	3753.6	79	905.8	950.8	3623.2	3803.2
992	883.6	928.6	3534.4	3714.4	18	893.6	938.6	3574.4	3754.4	80	906	951	3624	3804
993	883.8	928.8	3535.2	3715.2	19	893.8	938.8	3575.2	3755.2	81	906.2	951.2	3624.8	3804.8
994	884	929	3536	3716	20	894	939	3576	3756	82	906.4	951.4	3625.6	3805.6
995	884.2	929.2	3536.8	3716.8	21	894.2	939.2	3576.8	3756.8	83	906.6	951.6	3626.4	3806.4
996	884.4	929.4	3537.6	3717.6	22	894.4	939.4	3577.6	3757.6	84	906.8	951.8	3627.2	3807.2

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997	884.6	929.6	3538.4	3718.4	23	894.6	939.6	3578.4	3758.4	85	907	952	3628	3808
998	884.8	929.8	3539.2	3719.2	24	894.8	939.8	3579.2	3759.2	86	907.2	952.2	3628.8	3808.8
999	885	930	3540	3720	25	895	940	3580	3760	87	907.4	952.4	3629.6	3809.6
1000	885.2	930.2	3540.8	3720.8	26	895.2	940.2	3580.8	3760.8	88	907.6	952.6	3630.4	3810.4
1001	885.4	930.4	3541.6	3721.6	27	895.4	940.4	3581.6	3761.6	89	907.8	952.8	3631.2	3811.2
1002	885.6	930.6	3542.4	3722.4	28	895.6	940.6	3582.4	3762.4	90	908	953	3632	3812
1003	885.8	930.8	3543.2	3723.2	29	895.8	940.8	3583.2	3763.2	91	908.2	953.2	3632.8	3812.8
1004	886	931	3544	3724	30	896	941	3584	3764	92	908.4	953.4	3633.6	3813.6
1005	886.2	931.2	3544.8	3724.8	31	896.2	941.2	3584.8	3764.8	93	908.6	953.6	3634.4	3814.4
1006	886.4	931.4	3545.6	3725.6	32	896.4	941.4	3585.6	3765.6	94	908.8	953.8	3635.2	3815.2
1007	886.6	931.6	3546.4	3726.4	33	896.6	941.6	3586.4	3766.4	95	909	954	3636	3816
1008	886.8	931.8	3547.2	3727.2	34	896.8	941.8	3587.2	3767.2	96	909.2	954.2	3636.8	3816.8
1009	887	932	3548	3728	35	897	942	3588	3768	97	909.4	954.4	3637.6	3817.6
1010	887.2	932.2	3548.8	3728.8	36	897.2	942.2	3588.8	3768.8	98	909.6	954.6	3638.4	3818.4
1011	887.4	932.4	3549.6	3729.6	37	897.4	942.4	3589.6	3769.6	99	909.8	954.8	3639.2	3819.2
1012	887.6	932.6	3550.4	3730.4	38	897.6	942.6	3590.4	3770.4	100	910	955	3640	3820
1013	887.8	932.8	3551.2	3731.2	39	897.8	942.8	3591.2	3771.2	101	910.2	955.2	3640.8	3820.8
1014	888	933	3552	3732	40	898	943	3592	3772	102	910.4	955.4	3641.6	3821.6
1015	888.2	933.2	3552.8	3732.8	41	898.2	943.2	3592.8	3772.8	103	910.6	955.6	3642.4	3822.4
1016	888.4	933.4	3553.6	3733.6	42	898.4	943.4	3593.6	3773.6	104	910.8	955.8	3643.2	3823.2
1017	888.6	933.6	3554.4	3734.4	43	898.6	943.6	3594.4	3774.4	105	911	956	3644	3824
1018	888.8	933.8	3555.2	3735.2	44	898.8	943.8	3595.2	3775.2	106	911.2	956.2	3644.8	3824.8
1019	889	934	3556	3736	45	899	944	3596	3776	107	911.4	956.4	3645.6	3825.6
1020	889.2	934.2	3556.8	3736.8	46	899.2	944.2	3596.8	3776.8	108	911.6	956.6	3646.4	3826.4
1021	889.4	934.4	3557.6	3737.6	47	899.4	944.4	3597.6	3777.6	109	911.8	956.8	3647.2	3827.2
1022	889.6	934.6	3558.4	3738.4	48	899.6	944.6	3598.4	3778.4	110	912	957	3648	3828
1023	889.8	934.8	3559.2	3739.2	49	899.8	944.8	3599.2	3779.2	111	912.2	957.2	3648.8	3828.8
0	890	935	3560	3740	50	900	945	3600	3780	112	912.4	957.4	3649.6	3829.6
					51	900.2	945.2	3600.8	3780.8	113	912.6	957.6	3650.4	3830.4
					52	900.4	945.4	3601.6	3781.6	114	912.8	957.8	3651.2	3831.2
					53	900.6	945.6	3602.4	3782.4	115	913	958	3652	3832
					54	900.8	945.8	3603.2	3783.2	116	913.2	958.2	3652.8	3832.8
					55	901	946	3604	3784	117	913.4	958.4	3653.6	3833.6
					56	901.2	946.2	3604.8	3784.8	118	913.6	958.6	3654.4	3834.4
					57	901.4	946.4	3605.6	3785.6	119	913.8	958.8	3655.2	3835.2
					58	901.6	946.6	3606.4	3786.4	120	914	959	3656	3836
					59	901.8	946.8	3607.2	3787.2	121	914.2	959.2	3656.8	3836.8
					60	902	947	3608	3788	122	914.4	959.4	3657.6	3837.6
					61	902.2	947.2	3608.8	3788.8	123	914.6	959.6	3658.4	3838.4
					62	902.4	947.4	3609.6	3789.6	124	914.8	959.8	3659.2	3839.2

Table 2 – GSM1800 Channel to VCO operating frequency mapping

Ch	TX	RX	VCO TX	VCO RX	Ch	TX	RX	VCO TX	VCO RX	Ch	TX	RX	VCO TX	VCO RX
512	1710.2	1805.2	3420.4	3610.4	638	1735.4	1830.4	3470.8	3660.8	764	1760.6	1855.6	3521.2	3711.2
513	1710.4	1805.4	6841.6	7221.6	639	1735.6	1830.6	3471.2	3661.2	765	1760.8	1855.8	3521.6	3711.6
514	1710.6	1805.6	6842.4	7222.4	640	1735.8	1830.8	3471.6	3661.6	766	1761	1856	3522	3712
515	1710.8	1805.8	6843.2	7223.2	641	1736	1831	3472	3662	767	1761.2	1856.2	3522.4	3712.4
516	1711	1806	6844	7224	642	1736.2	1831.2	3472.4	3662.4	768	1761.4	1856.4	3522.8	3712.8
517	1711.2	1806.2	6844.8	7224.8	643	1736.4	1831.4	3472.8	3662.8	769	1761.6	1856.6	3523.2	3713.2
518	1711.4	1806.4	6845.6	7225.6	644	1736.6	1831.6	3473.2	3663.2	770	1761.8	1856.8	3523.6	3713.6
519	1711.6	1806.6	6846.4	7226.4	645	1736.8	1831.8	3473.6	3663.6	771	1762	1857	3524	3714
520	1711.8	1806.8	6847.2	7227.2	646	1737	1832	3474	3664	772	1762.2	1857.2	3524.4	3714.4
521	1712	1807	6848	7228	647	1737.2	1832.2	3474.4	3664.4	773	1762.4	1857.4	3524.8	3714.8
522	1712.2	1807.2	6848.8	7228.8	648	1737.4	1832.4	3474.8	3664.8	774	1762.6	1857.6	3525.2	3715.2
523	1712.4	1807.4	6849.6	7229.6	649	1737.6	1832.6	3475.2	3665.2	775	1762.8	1857.8	3525.6	3715.6
524	1712.6	1807.6	6850.4	7230.4	650	1737.8	1832.8	3475.6	3665.6	776	1763	1858	3526	3716
525	1712.8	1807.8	6851.2	7231.2	651	1738	1833	3476	3666	777	1763.2	1858.2	3526.4	3716.4
526	1713	1808	6852	7232	652	1738.2	1833.2	3476.4	3666.4	778	1763.4	1858.4	3526.8	3716.8
527	1713.2	1808.2	6852.8	7232.8	653	1738.4	1833.4	3476.8	3666.8	779	1763.6	1858.6	3527.2	3717.2
528	1713.4	1808.4	6853.6	7233.6	654	1738.6	1833.6	3477.2	3667.2	780	1763.8	1858.8	3527.6	3717.6
529	1713.6	1808.6	6854.4	7234.4	655	1738.8	1833.8	3477.6	3667.6	781	1764	1859	3528	3718
530	1713.8	1808.8	6855.2	7235.2	656	1739	1834	3478	3668	782	1764.2	1859.2	3528.4	3718.4
531	1714	1809	6856	7236	657	1739.2	1834.2	3478.4	3668.4	783	1764.4	1859.4	3528.8	3718.8
532	1714.2	1809.2	6856.8	7236.8	658	1739.4	1834.4	3478.8	3668.8	784	1764.6	1859.6	3529.2	3719.2
533	1714.4	1809.4	6857.6	7237.6	659	1739.6	1834.6	3479.2	3669.2	785	1764.8	1859.8	3529.6	3719.6
534	1714.6	1809.6	6858.4	7238.4	660	1739.8	1834.8	3479.6	3669.6	786	1765	1860	3530	3720
535	1714.8	1809.8	6859.2	7239.2	661	1740	1835	3480	3670	787	1765.2	1860.2	3530.4	3720.4
536	1715	1810	6860	7240	662	1740.2	1835.2	3480.4	3670.4	788	1765.4	1860.4	3530.8	3720.8
537	1715.2	1810.2	6860.8	7240.8	663	1740.4	1835.4	3480.8	3670.8	789	1765.6	1860.6	3531.2	3721.2

538	1715.4	1810.4	6861.6	7241.6	664	1740.6	1835.6	3481.2	3671.2	790	1765.8	1860.8	3531.6	3721.6
539	1715.6	1810.6	6862.4	7242.4	665	1740.8	1835.8	3481.6	3671.6	791	1766	1861	3532	3722
540	1715.8	1810.8	6863.2	7243.2	666	1741	1836	3482	3672	792	1766.2	1861.2	3532.4	3722.4
541	1716	1811	6864	7244	667	1741.2	1836.2	3482.4	3672.4	793	1766.4	1861.4	3532.8	3722.8
542	1716.2	1811.2	6864.8	7244.8	668	1741.4	1836.4	3482.8	3672.8	794	1766.6	1861.6	3533.2	3723.2
543	1716.4	1811.4	6865.6	7245.6	669	1741.6	1836.6	3483.2	3673.2	795	1766.8	1861.8	3533.6	3723.6
544	1716.6	1811.6	6866.4	7246.4	670	1741.8	1836.8	3483.6	3673.6	796	1767	1862	3534	3724
545	1716.8	1811.8	6867.2	7247.2	671	1742	1837	3484	3674	797	1767.2	1862.2	3534.4	3724.4
546	1717	1812	6868	7248	672	1742.2	1837.2	3484.4	3674.4	798	1767.4	1862.4	3534.8	3724.8
547	1717.2	1812.2	6868.8	7248.8	673	1742.4	1837.4	3484.8	3674.8	799	1767.6	1862.6	3535.2	3725.2
548	1717.4	1812.4	6869.6	7249.6	674	1742.6	1837.6	3485.2	3675.2	800	1767.8	1862.8	3535.6	3725.6
549	1717.6	1812.6	6870.4	7250.4	675	1742.8	1837.8	3485.6	3675.6	801	1768	1863	3536	3726
550	1717.8	1812.8	6871.2	7251.2	676	1743	1838	3486	3676	802	1768.2	1863.2	3536.4	3726.4
551	1718	1813	6872	7252	677	1743.2	1838.2	3486.4	3676.4	803	1768.4	1863.4	3536.8	3726.8
552	1718.2	1813.2	6872.8	7252.8	678	1743.4	1838.4	3486.8	3676.8	804	1768.6	1863.6	3537.2	3727.2
553	1718.4	1813.4	6873.6	7253.6	679	1743.6	1838.6	3487.2	3677.2	805	1768.8	1863.8	3537.6	3727.6
554	1718.6	1813.6	6874.4	7254.4	680	1743.8	1838.8	3487.6	3677.6	806	1769	1864	3538	3728
555	1718.8	1813.8	6875.2	7255.2	681	1744	1839	3488	3678	807	1769.2	1864.2	3538.4	3728.4
556	1719	1814	6876	7256	682	1744.2	1839.2	3488.4	3678.4	808	1769.4	1864.4	3538.8	3728.8
557	1719.2	1814.2	6876.8	7256.8	683	1744.4	1839.4	3488.8	3678.8	809	1769.6	1864.6	3539.2	3729.2
558	1719.4	1814.4	6877.6	7257.6	684	1744.6	1839.6	3489.2	3679.2	810	1769.8	1864.8	3539.6	3729.6
559	1719.6	1814.6	6878.4	7258.4	685	1744.8	1839.8	3489.6	3679.6	811	1770	1865	3540	3730
560	1719.8	1814.8	6879.2	7259.2	686	1745	1840	3490	3680	812	1770.2	1865.2	3540.4	3730.4
561	1720	1815	6880	7260	687	1745.2	1840.2	3490.4	3680.4	813	1770.4	1865.4	3540.8	3730.8
562	1720.2	1815.2	6880.8	7260.8	688	1745.4	1840.4	3490.8	3680.8	814	1770.6	1865.6	3541.2	3731.2
563	1720.4	1815.4	6881.6	7261.6	689	1745.6	1840.6	3491.2	3681.2	815	1770.8	1865.8	3541.6	3731.6
564	1720.6	1815.6	6882.4	7262.4	690	1745.8	1840.8	3491.6	3681.6	816	1771	1866	3542	3732
565	1720.8	1815.8	6883.2	7263.2	691	1746	1841	3492	3682	817	1771.2	1866.2	3542.4	3732.4
566	1721	1816	6884	7264	692	1746.2	1841.2	3492.4	3682.4	818	1771.4	1866.4	3542.8	3732.8

567	1721.2	1816.2	6884.8	7264.8	693	1746.4	1841.4	3492.8	3682.8	819	1771.6	1866.6	3543.2	3733.2
568	1721.4	1816.4	6885.6	7265.6	694	1746.6	1841.6	3493.2	3683.2	820	1771.8	1866.8	3543.6	3733.6
569	1721.6	1816.6	6886.4	7266.4	695	1746.8	1841.8	3493.6	3683.6	821	1772	1867	3544	3734
570	1721.8	1816.8	6887.2	7267.2	696	1747	1842	3494	3684	822	1772.2	1867.2	3544.4	3734.4
571	1722	1817	6888	7268	697	1747.2	1842.2	3494.4	3684.4	823	1772.4	1867.4	3544.8	3734.8
572	1722.2	1817.2	6888.8	7268.8	698	1747.4	1842.4	3494.8	3684.8	824	1772.6	1867.6	3545.2	3735.2
573	1722.4	1817.4	6889.6	7269.6	699	1747.6	1842.6	3495.2	3685.2	825	1772.8	1867.8	3545.6	3735.6
574	1722.6	1817.6	6890.4	7270.4	700	1747.8	1842.8	3495.6	3685.6	826	1773	1868	3546	3736
575	1722.8	1817.8	3445.6	3635.6	701	1748	1843	3496	3686	827	1773.2	1868.2	3546.4	3736.4
576	1723	1818	3446	3636	702	1748.2	1843.2	3496.4	3686.4	828	1773.4	1868.4	3546.8	3736.8
577	1723.2	1818.2	3446.4	3636.4	703	1748.4	1843.4	3496.8	3686.8	829	1773.6	1868.6	3547.2	3737.2
578	1723.4	1818.4	3446.8	3636.8	704	1748.6	1843.6	3497.2	3687.2	830	1773.8	1868.8	3547.6	3737.6
579	1723.6	1818.6	3447.2	3637.2	705	1748.8	1843.8	3497.6	3687.6	831	1774	1869	3548	3738
580	1723.8	1818.8	3447.6	3637.6	706	1749	1844	3498	3688	832	1774.2	1869.2	3548.4	3738.4
581	1724	1819	3448	3638	707	1749.2	1844.2	3498.4	3688.4	833	1774.4	1869.4	3548.8	3738.8
582	1724.2	1819.2	3448.4	3638.4	708	1749.4	1844.4	3498.8	3688.8	834	1774.6	1869.6	3549.2	3739.2
583	1724.4	1819.4	3448.8	3638.8	709	1749.6	1844.6	3499.2	3689.2	835	1774.8	1869.8	3549.6	3739.6
584	1724.6	1819.6	3449.2	3639.2	710	1749.8	1844.8	3499.6	3689.6	836	1775	1870	3550	3740
585	1724.8	1819.8	3449.6	3639.6	711	1750	1845	3500	3690	837	1775.2	1870.2	3550.4	3740.4
586	1725	1820	3450	3640	712	1750.2	1845.2	3500.4	3690.4	838	1775.4	1870.4	3550.8	3740.8
587	1725.2	1820.2	3450.4	3640.4	713	1750.4	1845.4	3500.8	3690.8	839	1775.6	1870.6	3551.2	3741.2
588	1725.4	1820.4	3450.8	3640.8	714	1750.6	1845.6	3501.2	3691.2	840	1775.8	1870.8	3551.6	3741.6
589	1725.6	1820.6	3451.2	3641.2	715	1750.8	1845.8	3501.6	3691.6	841	1776	1871	3552	3742
590	1725.8	1820.8	3451.6	3641.6	716	1751	1846	3502	3692	842	1776.2	1871.2	3552.4	3742.4
591	1726	1821	3452	3642	717	1751.2	1846.2	3502.4	3692.4	843	1776.4	1871.4	3552.8	3742.8
592	1726.2	1821.2	3452.4	3642.4	718	1751.4	1846.4	3502.8	3692.8	844	1776.6	1871.6	3553.2	3743.2
593	1726.4	1821.4	3452.8	3642.8	719	1751.6	1846.6	3503.2	3693.2	845	1776.8	1871.8	3553.6	3743.6
594	1726.6	1821.6	3453.2	3643.2	720	1751.8	1846.8	3503.6	3693.6	846	1777	1872	3554	3744

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595	1726.8	1821.8	3453.6	3643.6	721	1752	1847	3504	3694	847	1777.2	1872.2	3554.4	3744.4
596	1727	1822	3454	3644	722	1752.2	1847.2	3504.4	3694.4	848	1777.4	1872.4	3554.8	3744.8
597	1727.2	1822.2	3454.4	3644.4	723	1752.4	1847.4	3504.8	3694.8	849	1777.6	1872.6	3555.2	3745.2
598	1727.4	1822.4	3454.8	3644.8	724	1752.6	1847.6	3505.2	3695.2	850	1777.8	1872.8	3555.6	3745.6
599	1727.6	1822.6	3455.2	3645.2	725	1752.8	1847.8	3505.6	3695.6	851	1778	1873	3556	3746
600	1727.8	1822.8	3455.6	3645.6	726	1753	1848	3506	3696	852	1778.2	1873.2	3556.4	3746.4
601	1728	1823	3456	3646	727	1753.2	1848.2	3506.4	3696.4	853	1778.4	1873.4	3556.8	3746.8
602	1728.2	1823.2	3456.4	3646.4	728	1753.4	1848.4	3506.8	3696.8	854	1778.6	1873.6	3557.2	3747.2
603	1728.4	1823.4	3456.8	3646.8	729	1753.6	1848.6	3507.2	3697.2	855	1778.8	1873.8	3557.6	3747.6
604	1728.6	1823.6	3457.2	3647.2	730	1753.8	1848.8	3507.6	3697.6	856	1779	1874	3558	3748
605	1728.8	1823.8	3457.6	3647.6	731	1754	1849	3508	3698	857	1779.2	1874.2	3558.4	3748.4
606	1729	1824	3458	3648	732	1754.2	1849.2	3508.4	3698.4	858	1779.4	1874.4	3558.8	3748.8
607	1729.2	1824.2	3458.4	3648.4	733	1754.4	1849.4	3508.8	3698.8	859	1779.6	1874.6	3559.2	3749.2
608	1729.4	1824.4	3458.8	3648.8	734	1754.6	1849.6	3509.2	3699.2	860	1779.8	1874.8	3559.6	3749.6
609	1729.6	1824.6	3459.2	3649.2	735	1754.8	1849.8	3509.6	3699.6	861	1780	1875	3560	3750
610	1729.8	1824.8	3459.6	3649.6	736	1755	1850	3510	3700	862	1780.2	1875.2	3560.4	3750.4
611	1730	1825	3460	3650	737	1755.2	1850.2	3510.4	3700.4	863	1780.4	1875.4	3560.8	3750.8
612	1730.2	1825.2	3460.4	3650.4	738	1755.4	1850.4	3510.8	3700.8	864	1780.6	1875.6	3561.2	3751.2
613	1730.4	1825.4	3460.8	3650.8	739	1755.6	1850.6	3511.2	3701.2	865	1780.8	1875.8	3561.6	3751.6
614	1730.6	1825.6	3461.2	3651.2	740	1755.8	1850.8	3511.6	3701.6	866	1781	1876	3562	3752
615	1730.8	1825.8	3461.6	3651.6	741	1756	1851	3512	3702	867	1781.2	1876.2	3562.4	3752.4
616	1731	1826	3462	3652	742	1756.2	1851.2	3512.4	3702.4	868	1781.4	1876.4	3562.8	3752.8
617	1731.2	1826.2	3462.4	3652.4	743	1756.4	1851.4	3512.8	3702.8	869	1781.6	1876.6	3563.2	3753.2
618	1731.4	1826.4	3462.8	3652.8	744	1756.6	1851.6	3513.2	3703.2	870	1781.8	1876.8	3563.6	3753.6
619	1731.6	1826.6	3463.2	3653.2	745	1756.8	1851.8	3513.6	3703.6	871	1782	1877	3564	3754
620	1731.8	1826.8	3463.6	3653.6	746	1757	1852	3514	3704	872	1782.2	1877.2	3564.4	3754.4
621	1732	1827	3464	3654	747	1757.2	1852.2	3514.4	3704.4	873	1782.4	1877.4	3564.8	3754.8
622	1732.2	1827.2	3464.4	3654.4	748	1757.4	1852.4	3514.8	3704.8	874	1782.6	1877.6	3565.2	3755.2
623	1732.4	1827.4	3464.8	3654.8	749	1757.6	1852.6	3515.2	3705.2	875	1782.8	1877.8	3565.6	3755.6

624	1732.6	1827.6	3465.2	3655.2	750	1757.8	1852.8	3515.6	3705.6	876	1783	1878	3566	3756
625	1732.8	1827.8	3465.6	3655.6	751	1758	1853	3516	3706	877	1783.2	1878.2	3566.4	3756.4
626	1733	1828	3466	3656	752	1758.2	1853.2	3516.4	3706.4	878	1783.4	1878.4	3566.8	3756.8
627	1733.2	1828.2	3466.4	3656.4	753	1758.4	1853.4	3516.8	3706.8	879	1783.6	1878.6	3567.2	3757.2
628	1733.4	1828.4	3466.8	3656.8	754	1758.6	1853.6	3517.2	3707.2	880	1783.8	1878.8	3567.6	3757.6
629	1733.6	1828.6	3467.2	3657.2	755	1758.8	1853.8	3517.6	3707.6	881	1784	1879	3568	3758
630	1733.8	1828.8	3467.6	3657.6	756	1759	1854	3518	3708	882	1784.2	1879.2	3568.4	3758.4
631	1734	1829	3468	3658	757	1759.2	1854.2	3518.4	3708.4	883	1784.4	1879.4	3568.8	3758.8
632	1734.2	1829.2	3468.4	3658.4	758	1759.4	1854.4	3518.8	3708.8	884	1784.6	1879.6	3569.2	3759.2
633	1734.4	1829.4	3468.8	3658.8	759	1759.6	1854.6	3519.2	3709.2	885	1784.8	1879.8	3569.6	3759.6
634	1734.6	1829.6	3469.2	3659.2	760	1759.8	1854.8	3519.6	3709.6					
635	1734.8	1829.8	3469.6	3659.6	761	1760	1855	3520	3710					
636	1735	1830	3470	3660	762	1760.2	1855.2	3520.4	3710.4					
637	1735.2	1830.2	3470.4	3660.4	763	1760.4	1855.4	3520.8	3710.8					